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(54) Title: DATA INPUT DEVICE

(57) Abstract

A data input device has a moveable element, for example, a circular knob. This is moveable in two different directions, one of which can be circular and the other can be along the axis of the knob. A display unit is preferably associated with the screen, so that rotation of the knob in a first direction causes a pointer to scroll through a menu on the screen. Actuation of the knob in the second direction causes the different screens to be selected, or selected items on the screen to change their state. It can be used as a sole input device for microprocessor-based devices.

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Title: DATA INPUT DEVICE

FIELD OF THE INVENTION

This invention relates to a data input device. More particularly, this invention is concerned with a data input device, for inputting data to a computer-controlled or micro processor-controlled device or apparatus.

BACKGROUND OF THE INVENTION

Currently, both for personal use and also for commercial and industrial use, there is an increasingly large number of electronically controlled devices available. Many of these devices are computer-controlled or include microprocessors or the like. Also, for a micro processor or computer of any given power, both the cost and size continues to decrease.

As a consequence, manufacturers are able to continually enhance the functions and features available in any particular device or piece of equipment, without significantly increasing the cost, or even while reducing the cost. Thus, for domestic use, stoves, microwave ovens, stereos and other appliances, and also lighting, heating and timing devices now often include a microprocessor.

By way of example, in a domestic environment, video cassette recorders (VCRs) have become increasingly common, so that now in many developed countries, the majority of households have such a VCR. The original VCRs provided a number of basic functions, such as, playback, record and fast rewind, in either the forward or reverse directions. More modern VCRs offer a vast range of functions, including the ability to program the VCR to record at certain times, play back single frames, and numerous other features.

As a consequence, a control panel for such a VCR, whether on the VCR itself or on a separate remote unit, typically now has many different buttons. These

will often be identified by either single digits or letters, or some short acronym. As such, the individual functions of the buttons, or the sequence in which they should be pressed, is by no means immediately obvious, for any particular function. In many cases, a user needs to read and understand a fairly elaborate manual. For some people who are either not technically inclined, or simply do not have the time, this results in many functions being wasted or not used.

A similar problem occurs in an industrial environment, where individual pieces of equipment may have a large range of potential capabilities, but it is difficult for an unskilled user to comprehend all of these. By way of example, the assignee of the present invention manufactures a protective relay device, intended to replace a conventional relay device. This is a relay, for which some original designs used pneumatic/magnetic technology. The assignee's protective relay incorporates an electronic module, and operates as a voltage breaker. As such, the protective relay would be installed by an electrician, with a relatively low level of technical training, and who, in any event, is expected to understand and install a large variety of different types of electrical equipment.

In the field, this results in considerable difficulty in the installer understanding how to install the equipment and set it up so that it has the appropriate parameters for that particular usage. The assignee has found that it is not uncommon for these protective relays to be returned as being faulty, when in fact there is no fault whatsoever; the problem simply is that the installer has not understood how to program or set up the device properly to function in the desired manner.

It can be noted that similar problems exist with pure software. It is not uncommon to find software packages with extensive manuals. These manuals in written form can amount to many thousands of pages. For such

large pieces of software, it is not uncommon to have a large team of people writing the software, any one of which would only be familiar in detail with a small section of the overall software package.

There thus arises a basic communication barrier. There are now available a large range of devices and equipment, which offer numerous different functions and applications. The problem is for any user to comprehend the potential uses, and understand how to set up or control the device to function in the intended manner.

It is desirable to provide some input or interface device, which is simple, robust, and would readily enable a user to input the desired control information, without the necessity of studying any lengthy manuals or the like.

SUMMARY OF THE PRESENT INVENTION

In accordance with the present invention, there is provided a data input device, comprising:

a housing;

a moveable element mounted in the housing moveable in a first direction along a path through a plurality of different positions, and moveable in a second direction between at least two spaced apart locations;

first sensing means for sensing the position of the moveable element along said path to generate a first input signal; and

second sensing means for sensing when the moveable element is moved between the different locations in the second direction, to generate a second input signal.

Preferably, the path is a circular path, with the moveable element mounted for rotation about an axis. The path then becomes endless. The first sensing means then senses the degree of rotation of the moveable element along that axis. The number of positions on the path is infinite. For practical purposes, it will usually be

sufficient to treat the path as having a number of discrete positions, so that the relative rotation of the moveable element can readily be digitized.

In this case, it is preferable for the moveable element to comprise a disk-like knob mounted for rotation about an axis perpendicular to an external surface of the housing. However, as an alternative, it could comprise a generally disk-shaped knob having a certain depth in an axial direction, mounted for rotation about an axis that is parallel too, but spaced below, an external face of the housing. A portion of this knob would then protrude through a suitable rectangular opening in the face of the housing. In known manner, the knob can then be rotated by a finger engaging the exposed portion of the knob.

Concerning the second sensing means, the moveable element is preferably resiliently biased to a first location, and is capable of being displaced from that first location, in a direction generally perpendicular to the face of the housing and inwardly, to a second location. On reaching the second location, this is detected by the second sensing means, so that the knob can then be released, with the resilient biasing means returning it to the first location.

Preferably, the resilient biasing means is such as to provide some "click" type action, which is detectable either audibly and/or tactilely.

Similarly, where the moveable element comprises a rotatably mounted knob, this can be provided with some mechanical action to provide an audible/tactile sense of moving through a number of discrete positions, i.e. a "click" type action.

It will be appreciated that, for certain applications, which may well be limited, it is possible that the path along which the moveable element can move can be purely linear or straight. In this case, the path must necessarily be of limited length. As discussed below, it would then be necessary to provide for

additional features to deal with the situation when the moveable element comes up against the end of the path, but it is necessary, for input purposes, to displace it even further in a direction beyond the end of the path.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a perspective view of a first embodiment of the data input device of the present invention, including a rotatably mounted knob and a display screen;

Figure 2 is a partially cut away perspective view of the device of Figure 1;

Figure 3 is a perspective view of a second embodiment of the present invention, including a rotatably mounted knob, mounted about a different axis;

Figure 4 is a perspective view of a third embodiment of the present invention, including a linearly-mounted control knob;

Figures 5A - 5SS are views of exemplary input screens, for one application of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figure 1, an input device as a whole is indicated by the reference numeral 1. The device 1 includes a housing 3, having a front face or panel 4. The panel 4 includes a rectangular display 5 and the housing 3 has appropriate input/output sockets 6. This face or panel 4 also has a circular opening 7.

Within the opening 7 a control knob or element 9 is rotatably mounted, about an axis generally perpendicular to the front face 4. The outer surface of the control knob 9 includes a small circular depression or recess 11 adjacent one edge, to provide a finger tip grip

or engagement recess.

Below the control knob 9, and integral and coaxial therewith, is an encoder drum 15. This comprises axially extending strips of reflective (metallic) material alternating with non-reflective (black) material.

In known manner, the knob 9 is mounted for free and unlimited rotation in either direction about its axis. To detect this rotation, infrared emitter and sensor units 17, 18 are provided at 90° spacing, as shown. These are mounted so as to have a quadrature relationship, relative to the spacing of the reflector/non-reflective strips. The outputs of the emitter/sensors 17, 18 can then be used to both determine the amount of rotation and the direction of rotation.

The outputs of the units 17, 18 are, in this embodiment, connected to a conventional PC type serial mouse circuit 19. In effect, this would be to one half of the mouse circuit; the mouse circuit provides for detecting movement in two different directions, but the second direction is not present in this device.

As a preferred embodiment, the mouse circuit, in known manner, would be connected to a conventional PC serial port; this serial port could either be part of a PC or any other device accepting data in a similar manner. This serial port would also provide a low voltage DC power supply to the emitter/sensor units 17, 18.

The rotational motion of the knob 9 is indicated by arrows 20. Additionally, as indicated by arrow 21, the knob is capable of restricted linear movement in a second direction, generally perpendicular to the front face of the panel 4.

As indicated at 23, a return spring, providing a resilient biasing force, would be provided at the inner or bottom end of the knob 9, to bias it to a position flush with the control panel 4, this being a first location for the knob 9. A user can depress the knob, against the action of the spring 23 to a second location

below the face of the panel 4. This second location is such as to cause the knob 9 to actuate a switch 25. This switch 25 then sends an appropriate signal through to the PC serial port, through the mouse circuit 19.

The spring 23 comprises sheet spring clips.

In use, a user can rotate the knob 9. For rapid rotation, the depression 11 can be engaged with a finger, which allows for a high degree of controllable rotation. As detailed below, this allows for a pointer to be scrolled through a menu. When desired, the knob 9 can be depressed, causing the switch 25 to send an appropriate input signal to the control device. The rotational direction and speed, combined with the switch signal are passed to the PC mouse circuit as a series of pulses, in known manner. As an alternative, dedicated circuitry and associated software could be provided.

Further, although not shown, the shaft of the knob 9 could be provided with a variety of uniformly spaced grooves or depressions, with some spring element or the like engaging them, to provide a "click" type action, which would provide both audible and tactile indication of the degree of rotation.

As a further alternative, the switch 25 could be replaced by an optical sensor or an infrared beam, the beam being interrupted by depression of the knob 9.

Reference will now be made to Figures 3 and 4, which show second and third embodiments of the invention. In these two embodiments, the electrical components can be essentially similar to those shown in Figure 1, and they would include a display although this is not shown. The difference is that the actual configuration or mode of operation of the knob is different. Accordingly, only the difference in the knob configuration is detailed in relation to Figures 3 and 4.

Figure 3 shows the second embodiment of the device, generally indicated by reference 31. Here, a housing 33 is provided with a generally rectangular

opening 35. A knob 37 is generally disk-shaped and is mounted for rotation about its axis 39. The axis 39 is parallel to and spaced below the front face of the housing 33. As a consequence, a portion of the knob 37 projects through the rectangular opening 35, so that in known manner it can be rotated by a user's fingers.

The knob 37 is rotationally mounted at either end of its axis, in bearings which are resiliently mounted, to permit displacement of knob 37 in the direction perpendicular to the front face of the housing 33. Again, this would be achieved by simply pressing on the exposed portion of the knob 37. As in the first embodiment, some switch devices, comparable with switch 25, would be provided to detect such displacement of the knob 37 between the first location shown and a depressed, second location.

As for the first embodiment, the knob 37 is mounted for unlimited rotational movement, and similar inputs can be obtained.

Turning to Figure 4, this shows a linear version of the device, generally indicated by the reference 41. Here, the housing, at 43, is provided with a rectangular opening 45. The knob 47 is now mounted for linear sliding movement along the length of the rectangular opening 45. It would again be mounted to permit resilient deflection inwardly in a second direction, between first and second locations. As before, appropriate circuitry would be provided to detect the linear displacement, in a first direction along the length of the rectangular slot 45. Further, a switch, comparable to switch 25 would be provided to detect inward displacement of the knob 47.

Reference will now be made to Figure 5A - 5SS, which show a typical use of the input device of Figures 1 - 4. The device would be used in accordance with appropriate software. The device provides input information, which in general terms, comprises a first, infinitely variable signal, indicative of the degree of

rotational displacement of the control in the first direction, and a second signal indicating when the knob has been displaced between the first and second locations in the second direction.

In this described application of the device, the first signal is used to cause a cursor or pointer to scroll through a menu or list of choices in each screen. The second signal is used to indicate a choice made by the user, and cause the software to switch to the next input screen and the like. This preferred embodiment is discussed in relation to a protective relay device.

Figure 5A shows an overall program or chart, most of which is concerned with operation during first commissioning. On first commissioning, this device can be taken through various steps, indicated as: orientation; setup; settings; etc. These are described below, in relation to the appropriate figures.

Figure 5B shows the display at the main level. At 50, there is an icon representing the main menu. Beside this is an icon 52 showing open contacts, indicating that the relay device is open. A row of simulated lights are indicated as L, S, I and G, for respectively, Long, Short, Instantaneous and Ground Fault. If any of these are filled in or solid, this indicates that the relay has opened on the appropriate condition.

By rotating the appropriate knob 9 etc., a cursor or pointer 55 can be scrolled through the menu list, when the desired choice is reached, the knob 9 is pressed in the second direction, or clicked; this causes the program to switch to the next appropriate display.

If display graph is chosen, then Figures 5C - 5F show the different screens in the display graph mode, which would be displayed in sequence. Figure 5C shows the display for the long delay characteristics. Here, the top bar shows the current, with the solid portion on the left indicating the actual current at 300 amps and the line in the middle of the bar indicating the pickup current set at

375 amps. Here, the delay timer is set at 4.8 seconds.

As shown, at 53 is an icon representing closed contacts, showing normal operation of the relay. At 56 is an icon representing the next screen, enabling a user to go through the four display screens of Figures 5C - 5F to examine the operating condition of the relay. In Figure 5F, there is an arrow 51 enabling the previous screen to be displayed.

Turning to Figure 5G, this shows the display at the setup level which would be shown, after the orientation was established. Again, the pointer 55 could be used to choose the appropriate screens, by clicking or pressing on the knob with a pointer adjacent the desired choice.

If settings is selected, Figure 5H is shown. Again, the appropriate setting can be chosen, and Figures 5I - 5L show the different screens for these four different settings.

On the long delay screen, Figure 5I, "CT", i.e. the current transformer value, is shown as 500:1. This is adjusted depending upon the value of the current being monitored.

Two bar charts are shown. The first indicates the pickup value and the second, the delay time. With the pointer 55 adjacent the pickup legend, the knob can be depressed. This causes the bar to be shown as solid up to the set pickup level. The knob can then be rotated to adjust the pickup current to the desired level; a further click or depression action on the knob will cause the new pickup level to be set. This effects a numeric data entry. The pointer 55 can then be scrolled down to the delay legend, and the sequence repeated, to set the delay time to that desired. As indicated at the bottom, the long delay can be set for thermal memory. With the pointer 55 adjacent the thermal memory legend, depressing the knob causes this to be toggled on/off as desired.

The characteristics of the Short Delay,

Instantaneous and Ground Fault Settings are set similarly.

As shown at Figure 5J, a check mark can appear beside the I^2T legend, indicating that this has been chosen.

With the utilities chosen in the setup screen of Figure 5G, the utilities screen, Figure 5M will be shown. Again, the pointer 55 can be scrolled through and the appropriate utility chosen.

When display is chosen, the screen of Figure 5N is shown. With orientation chosen from this screen, Figure 5O can be shown. The user can then select one of the four different orientations depending upon the application.

Figure 5P shows the screen for backlight selection. This enables a backlight effect to be added. Selection of high sets it at high level. The manual legend enables a toggling between manual or automatic backlighting, with automatic backlighting being based on sensing the light level. Finally, the on legend can be used to toggle the backlighting on/off.

Figure 5Q shows the time/date format. Again, the pointer 55 can be scrolled through and the appropriate format selected. The hide legend enables the format to be simply turned on and off. DST enables daylight savings time to be turned on/off. As shown in Figure 5R, a time format can be toggled to 12 hours or 24 hours. The date format of Figure 5S enables various date formats to be chosen, with M, D, Y, designating, as usual, month, day and year.

On the display screen of Figure 5N, the final choice is power down, this screen being shown in Figure 5T. This enables the time to be set, after which the display will be turned off if no activity is detected. This is intended to save power. Again, by clicking or depressing of the knob, the actual value of the time can be selected, and rotation of the knob will then adjust the value. Further clicking of the knob sets the numeric

value.

In the display screen of Figure 5N, if time/date is selected, then the screen of Figure 5U is presented. If a set time is selected, then the Figure 5V appears. To set the time, the knob 9 is depressed, causing the first number to flash, or otherwise be highlighted. Rotation of the knob then sets this to the desired level. Further depressing of the knob causes the next number too be highlighted and the sequence can be repeated for this number and the final number. Further depression or clicking of the knob 9 causes the final number to be set, and the screen to be exited.

The date can be set in Figure 5W similarly.

In the utilities screen, the password screen of Figure 5X can be selected. Depressing the knob with the pointer opposite enable password, toggles this feature on and off. The password can be changed by depressing the knob with the pointer opposite change password.

As Figure 5Y shows, the password is presented as a numeric sequence. The numbers can be changed in a similar manner as for the time and date discussed above.

Figure 5Z shows a CT ratio, which screen is obtained by selecting interface in the utilities screen. This is the current transformer ratio, a known characteristic in the relay art. It would be set in a similar manner, i.e. by clicking on the knob to select the ratio, rotating the knob to reach the desired value, and further clicking or depression of the knob to set it.

At Figure 5AA, a help screen is shown, and different selections shown can be made. Figure 5BB shows the display at the icon level. Four Figures 5CC - 5FF show different levels within the icon level. These various icons are, in general, self-explanatory. The result passed icon could be used to indicate that an input is acceptable. In Figure 5FF, the icons for result failed; warning; event alert; are not currently used, but are available for future use.

Figure 5GG shows a delay definition screen, which gives delay definitions, in accordance with standard relay practice. Similarly, Figure 5HH shows a trip time calculator, in accordance with standard relay practice.

Figure 5II shows a default screen obtained from selection in the setup screen. This enables either set factory values or last or previous values to be selected. Again, the pointer is simply scrolled adjacent the design choice, and depressing the knob causes this to be toggled on and off.

When commissioned, the test screen can be selected from the main screen, and this is shown in Figure 5JJ. Each of the various settings can be tested. Again, if a fault condition has arisen, then one or more of the simulated lights L, S, I AND G will be shown as solid.

Figures 5KK - 5NN show the displays at the test level. These are generally similar and just the long delay screen Is described. As Figure 5KK shows, the top bar is shown as solid, indicating a large current. The pickup bar is now shown in inverse, i.e. as a white line. This causes the long delay to trip. As shown in the bottom bar, the time is equal to the delay time of 4.8 seconds, indicating proper operation.

When run is selected, the different run levels of screens 500 -5SS can be selected. This enables an operator to scroll through the different screens and check the parameters that have been set.

Figure 3 shows the linear version of the device, which as noted has the limitation that it does not provide for unlimited movement in one direction. Suitable software can be provided to handle this. For example, in relation to the pickup adjustment a linear sliding knob 37 could be moved from left to right, corresponding to the length of the pickup bar. As part of the adjustment, the position of the knob 37 will depend on this movement in the previous screen, so it may be completely misaligned relative to the length of the pickup bar. Thus, for

example, when the pickup bar is reduced to a zero length, the knob 37 could still be somewhere in the middle of its path; correspondingly, movement of the knob to its extreme right would not move the pickup bar fully to the right. To handle this, the knob 37 would be moved fully to its left, during which the pickup bar would be reduced to and then held at a zero value. This would then align the extreme left hand position of the knob 37 with a zero pickup value, so that the knob would be fully in alignment with the pickup bar, so that any value of the pickup bar could be set. It will be appreciated that in any menu or screen, the scrolling of the pointer 55 is effectively along a defined path with end limits, and this can be aligned with the knob 37 in a similar manner.

Various modifications are possible within the scope of the present invention. Thus, for movement in the second direction, i.e. depression of the knob 9, a switch could be provided that detects two or more different positions. Also, the related software can be such as to detect the difference between, for example, a single depression or click of the knob 9, two quick depressions, two depressions with a significant time interval between.

CLAIMS:

1. A data input device comprising:

a housing;

a moveable element mounted in the housing, moveable in a first direction along a path through a plurality of different positions, and moveable in a second direction between at least two spaced apart locations;

first sensing means for sensing the position of the moveable element along said path to generate a first input signal; and

second sensing means for sensing when the moveable element is moved between the different locations in the second direction, to generate a second input signal.

2. A data input device as claimed in claim 1, wherein the housing has a generally planar face defining a generally circular aperture, wherein the moveable element comprises a generally circular knob located in that aperture, and mounted for rotation about an axis generally perpendicular to the housing face, with the first direction corresponding to the degree of rotation of the knob.

3. A data input device as claimed in claim 2, wherein the second direction is along the axis of the knob, with the knob being usually located in a first location generally flush with the housing face, and being capable of being depressed, inwardly to a second location.

4. A data input device as claimed in claim 3, wherein the knob is resiliently biased to a first location.

5. A data input device as claimed in claim 2, 3 or 4, wherein the knob includes at least one generally circular finger recess adjacent the circumference thereof, for engagement by a user's fingertip.

6. A data input device as claimed in claim 1, wherein the housing has a face defining a generally rectangular opening, and wherein a moveable element comprises a generally disk-shaped knob mounted for rotation about an axis thereof, with the first direction corresponding to the degree of rotation of a knob, wherein the axis of the knob is located parallel to and spaced apart from the rectangular opening and a portion of the knob protrudes through the opening, and wherein said second direction is generally perpendicular to a tangent to the circumference of the knob at the protruding portion thereof.

7. A data input device as claimed in claim 6, wherein the second direction is generally perpendicular to the plane of the rectangular opening, and wherein the knob is resiliently biased to a first location, protruding through the rectangular opening, and is deflectable inwardly to a second location.

8. A data input device as claimed in claim 1, wherein the housing defines an elongate slot, wherein the moveable element comprises a knob mounted for movement along the length of the slot, which defines the first direction, and wherein the second direction is generally perpendicular to the second direction.

9. A data input device as claimed in claim 1, 2, 6 or 8, which includes circuitry connected to the first and second sensing means, for converting the first and second signals into a standard signal format, for communication to a serial port of a computing device.

10. A data input device as claimed in claim 2 or 6, wherein the knob includes a drum portion including alternating bands of dark and light material, and wherein the first sensing means comprises first and second emitter and sensor units, mounted for quadrature detection, to detect both the direction of rotation and the degree of rotation of the knob.

11. A data input device as claimed in claim 1, which includes a display unit for displaying a plurality of different screens, each of which comprises a menu having a plurality of different items and a pointer indicating a selected item; and display input means connected to the display unit and the first and second sensing means, wherein movement of the moveable element in the first direction causes the pointer to scroll through the list of the items on the screen, and with the pointer adjacent a selected item, displacement of the moveable element between different locations in the second direction causes the screen to change.

12. A data input device as claimed in claim 11, wherein displacement of the moveable element between different locations in the second direction causes one of (a) a new screen to be displayed corresponding to an item selected in a previous screen; and (b) a selected item to be highlighted, to enable a value thereof to be altered.

13. A data input device as claimed in claim 12, wherein, when (b) is selected, the displacement of the moveable element in the first direction causes the corresponding value to be altered, and subsequent deflection of the moveable element in the second direction causes a numerical value to be set and the screen to be returned to a previous condition.

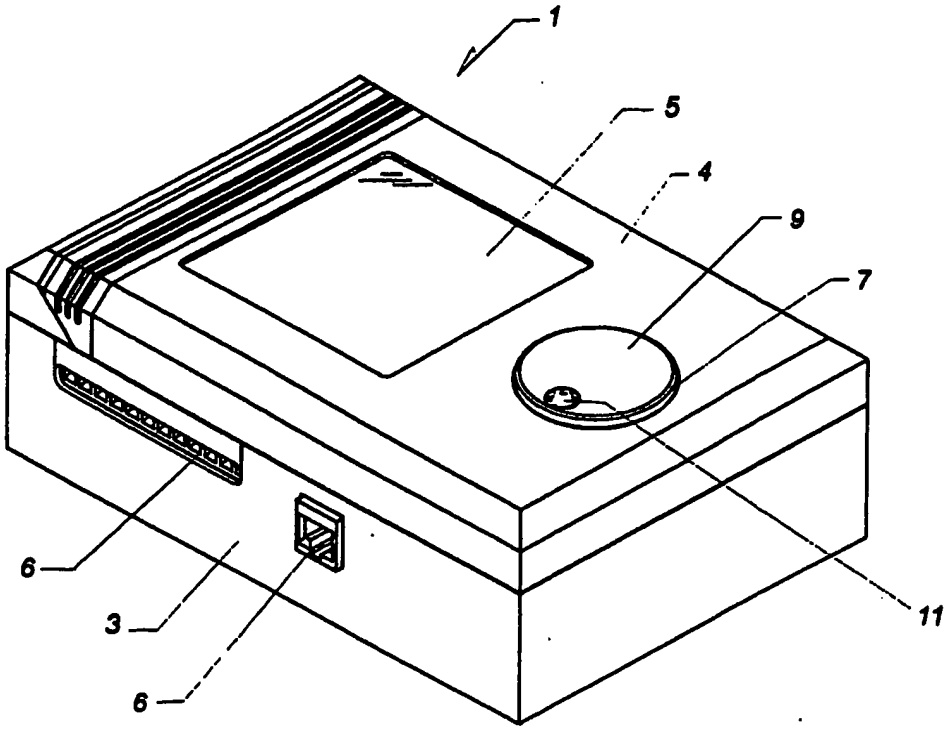


FIGURE 1

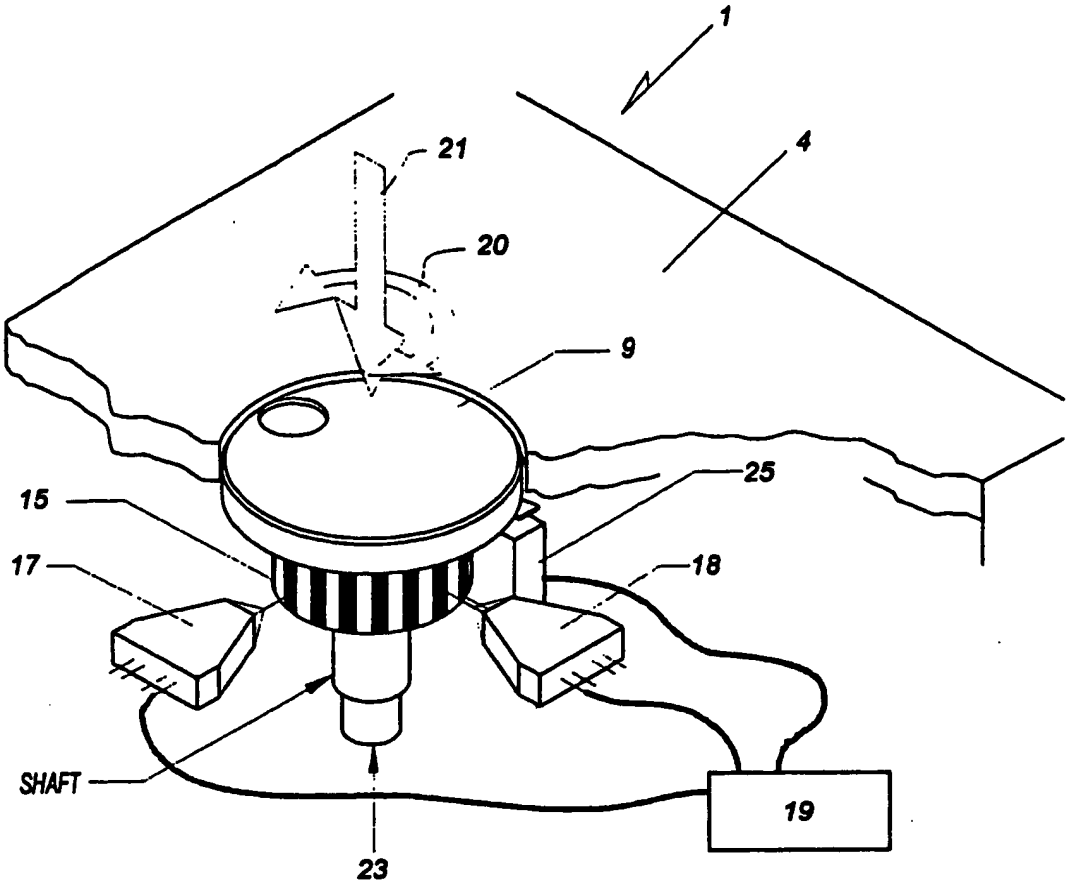


FIGURE 2

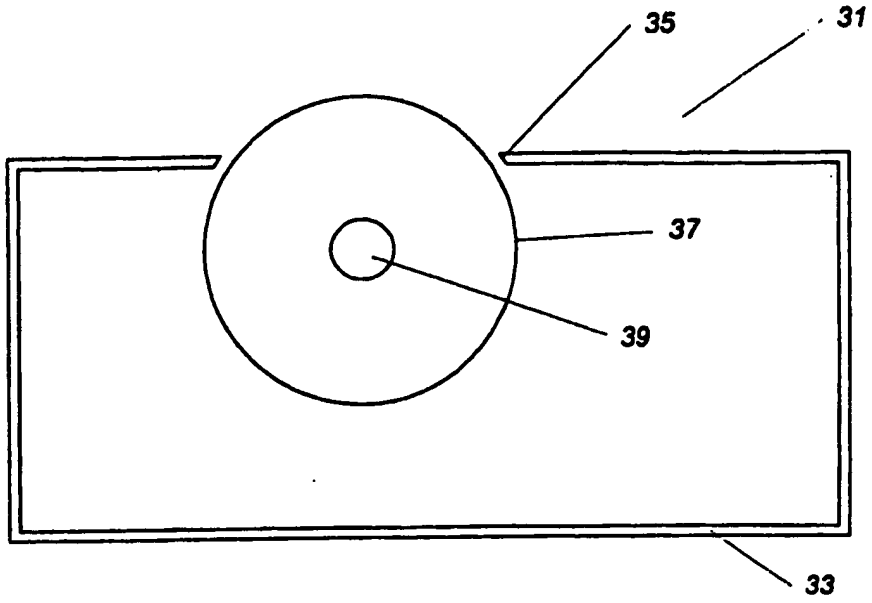


FIGURE 3

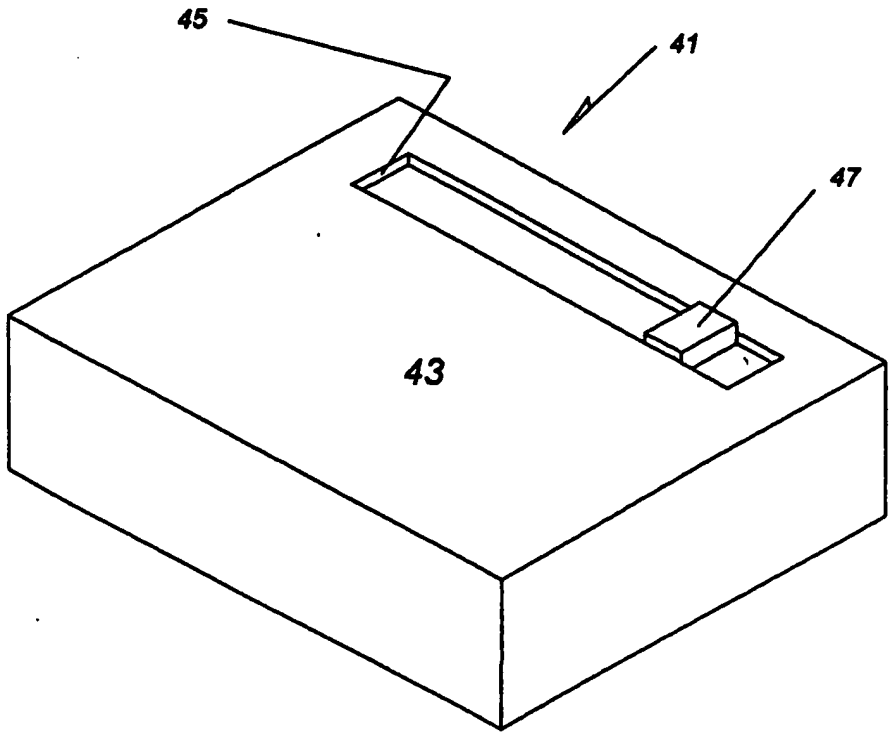


FIGURE 4

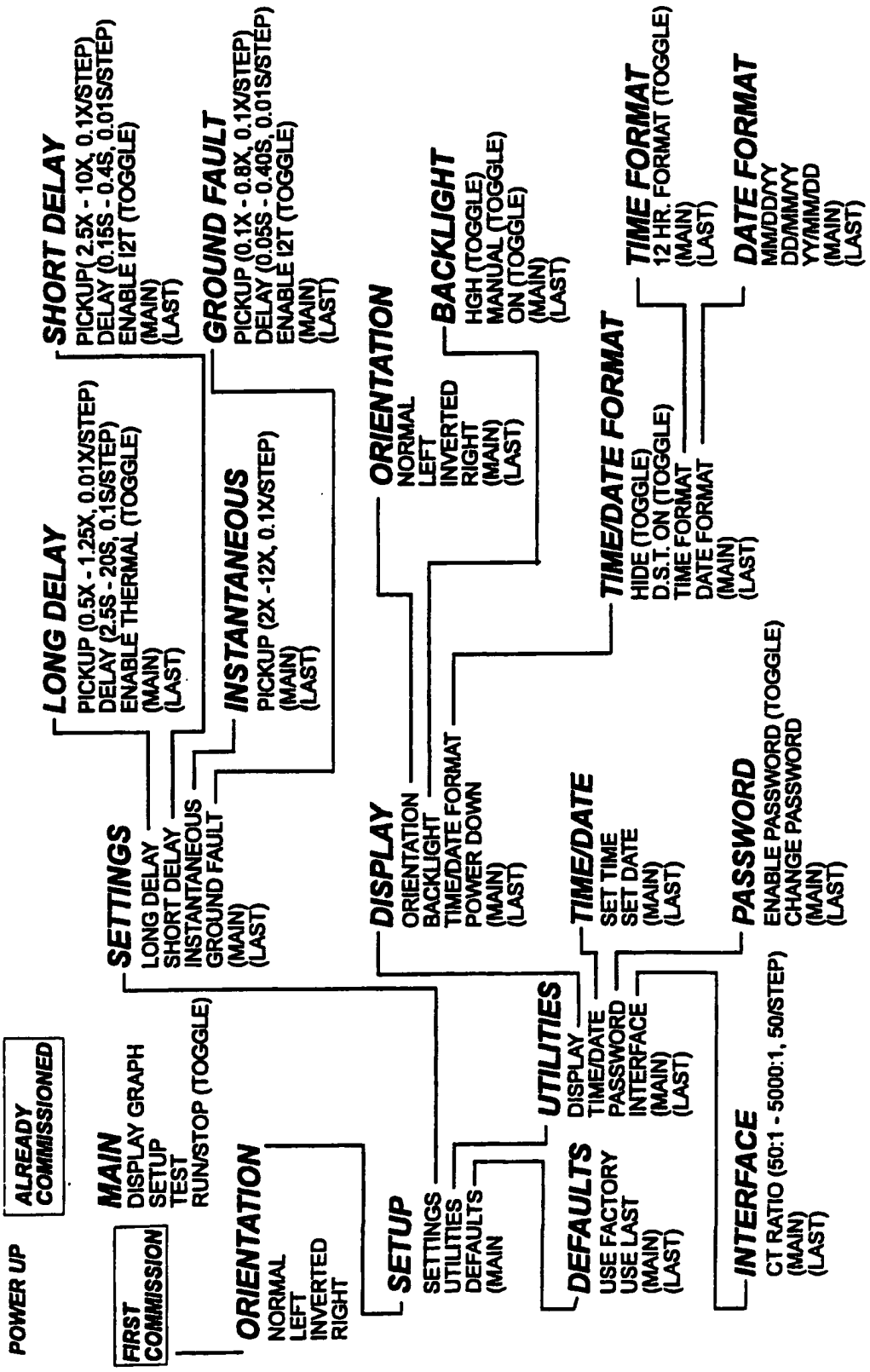
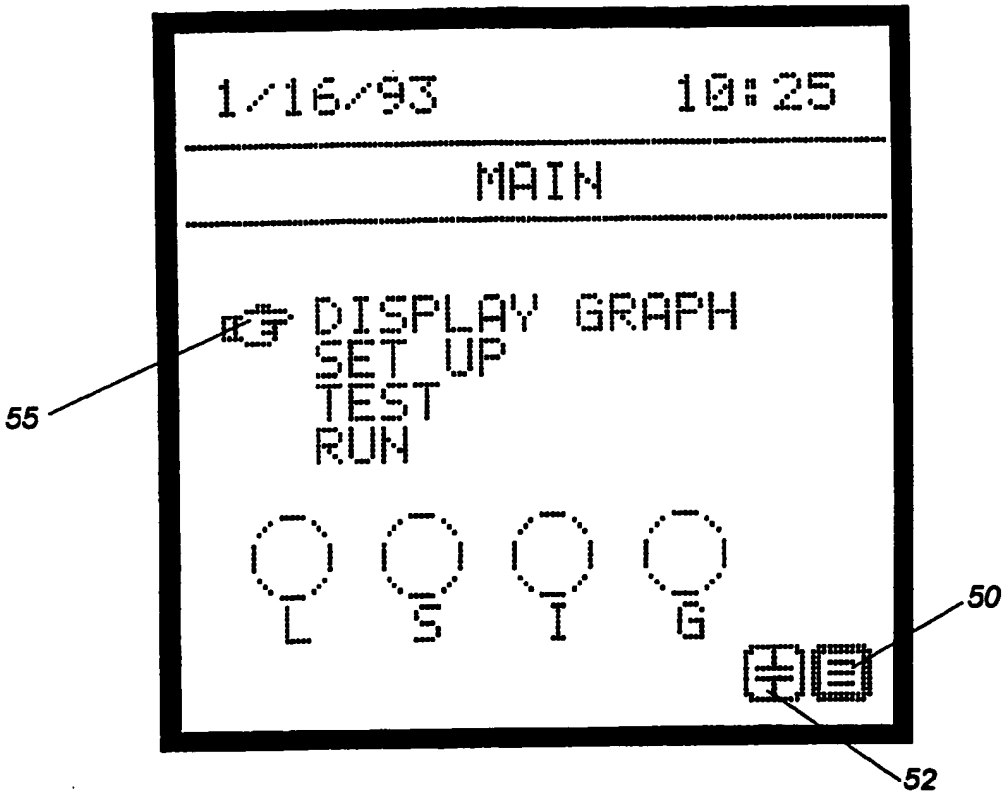


FIGURE 5A
SUBSTITUTE SHEET



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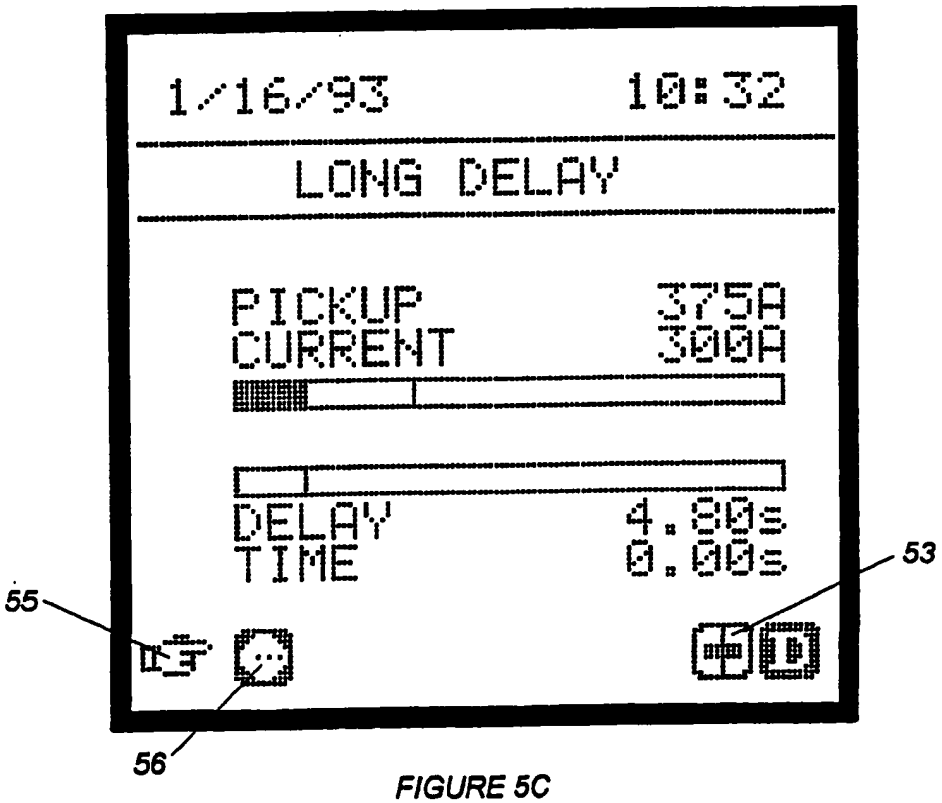


FIGURE 5C

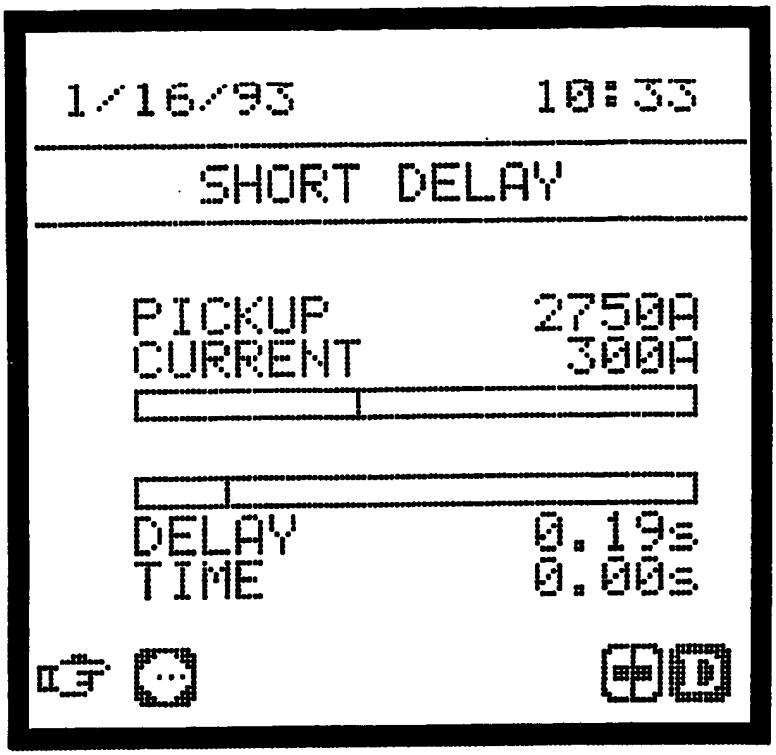


FIGURE 5D

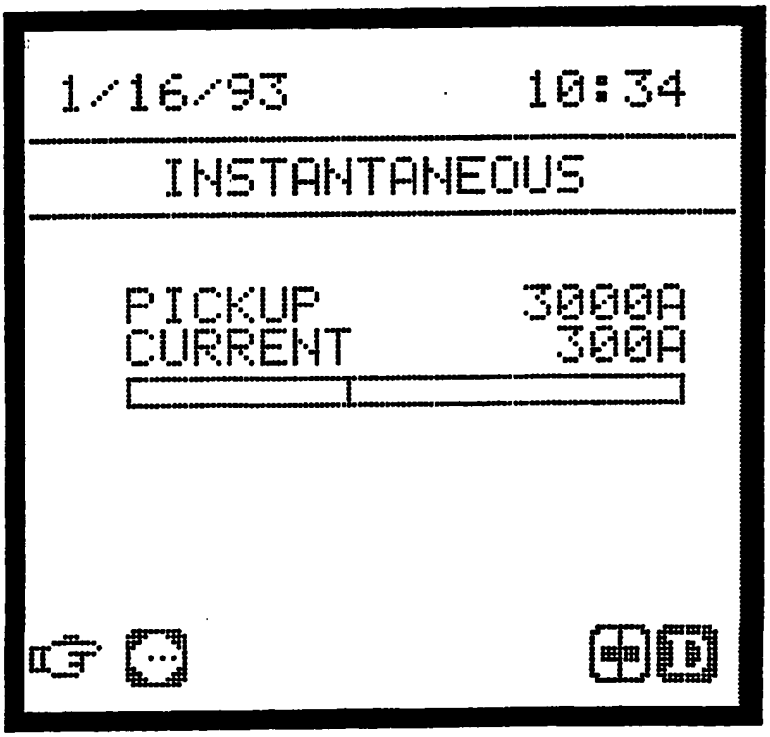
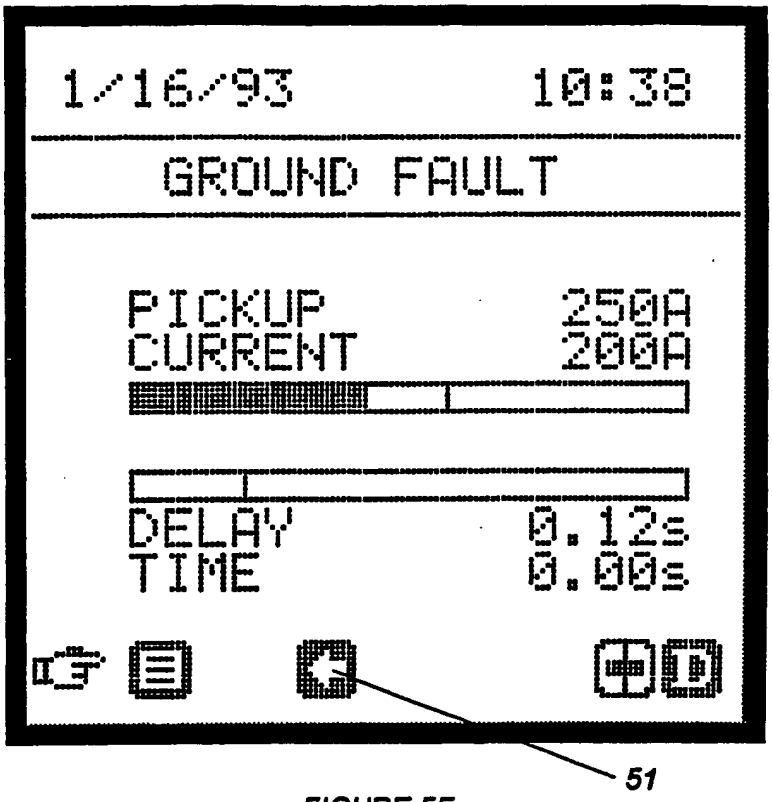


FIGURE 5E



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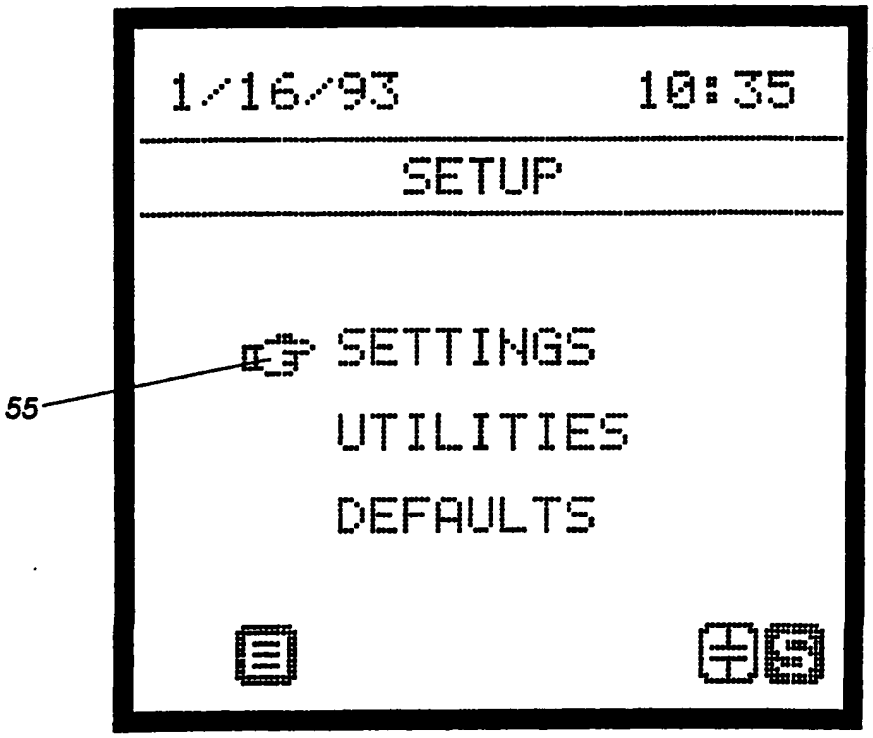

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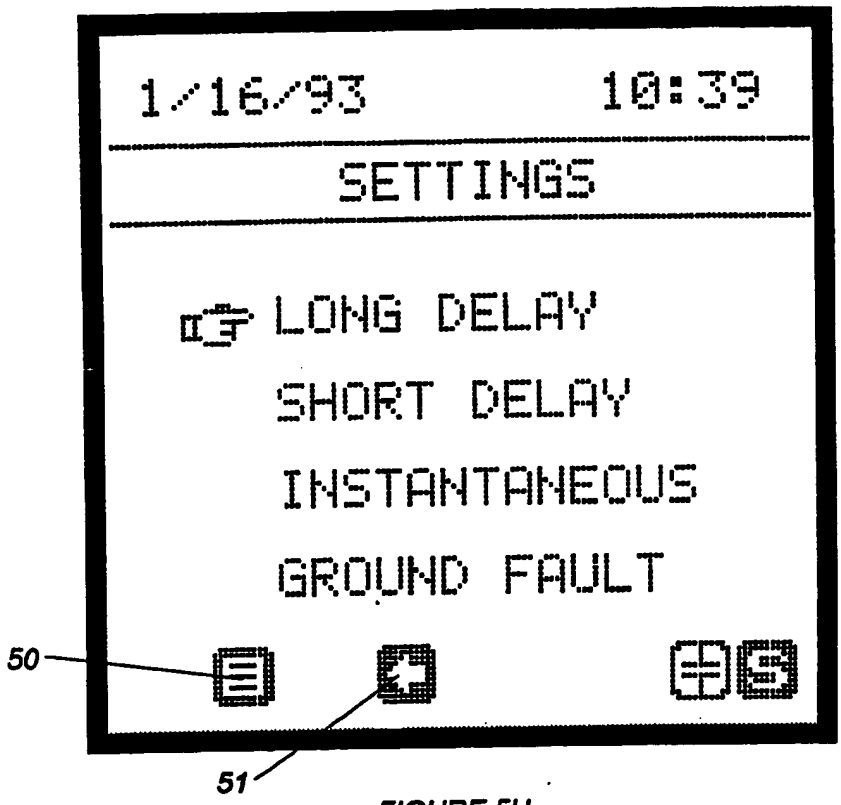

FIGURE 5H

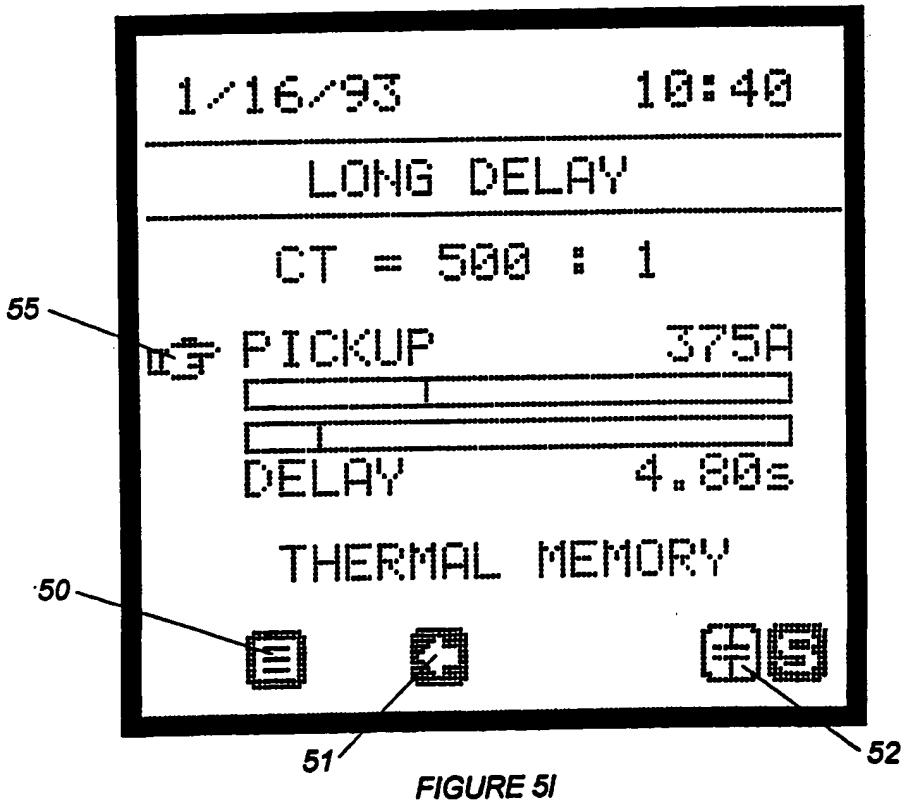

FIGURE 5I

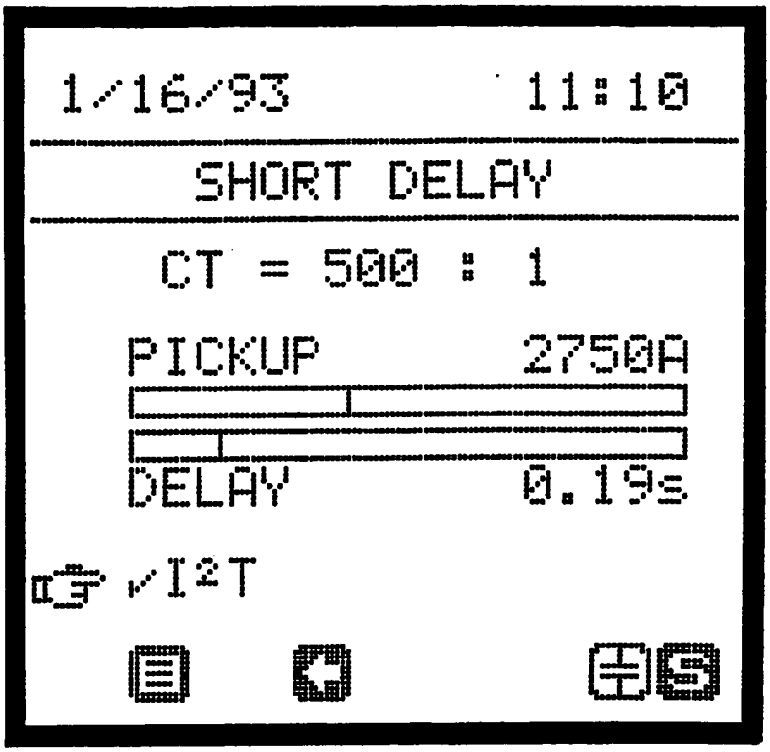

FIGURE 5J

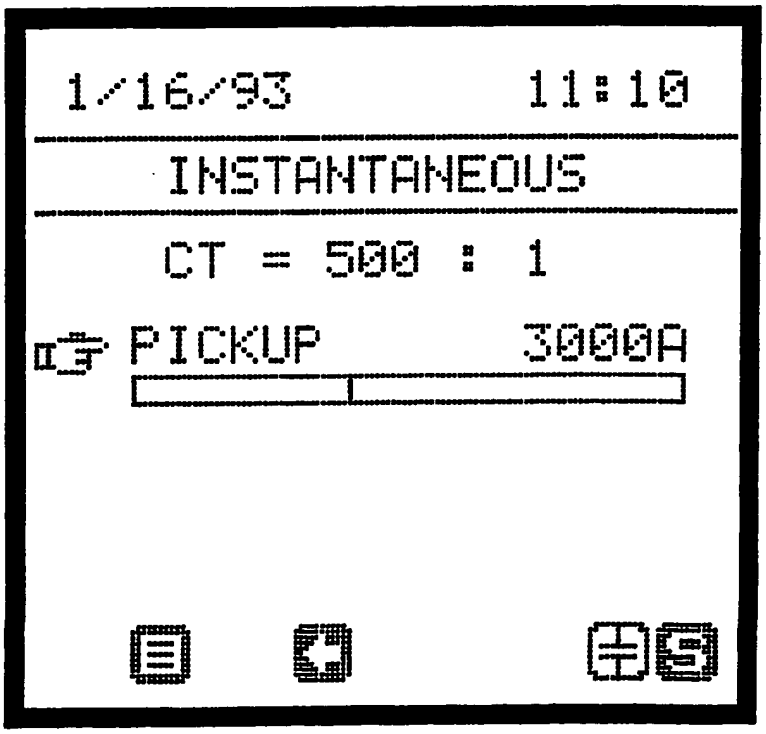

FIGURE 5K

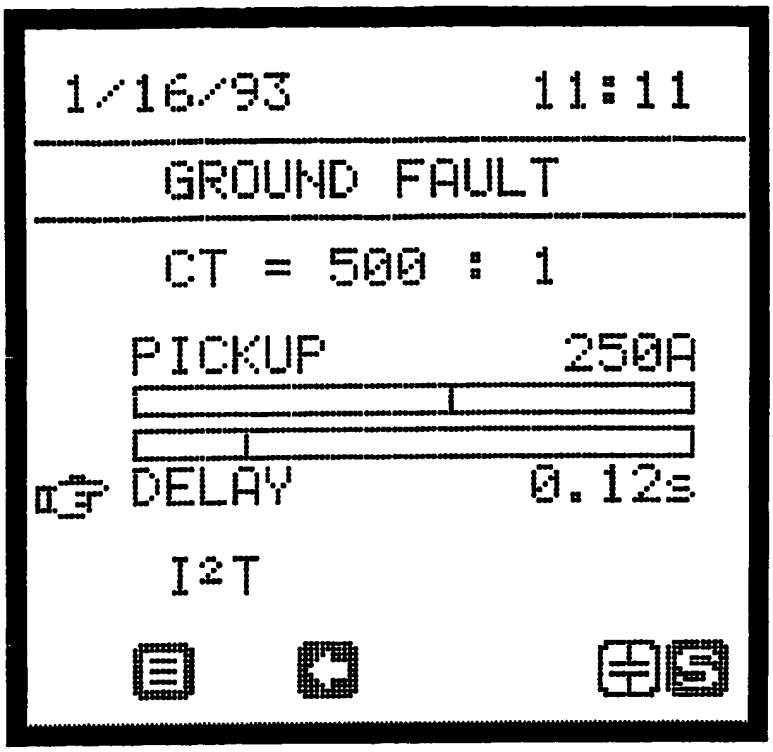

FIGURE 5L

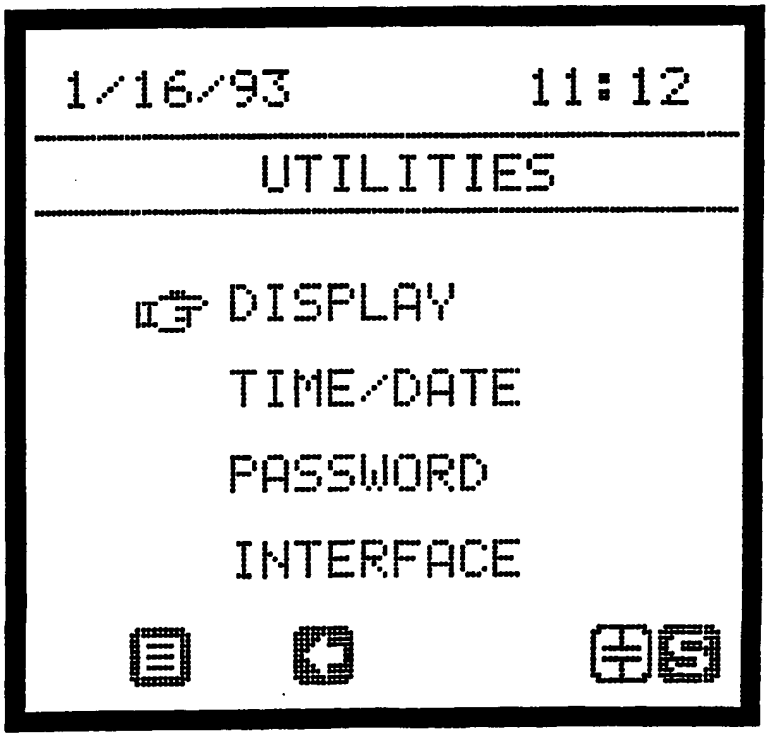

FIGURE 5M

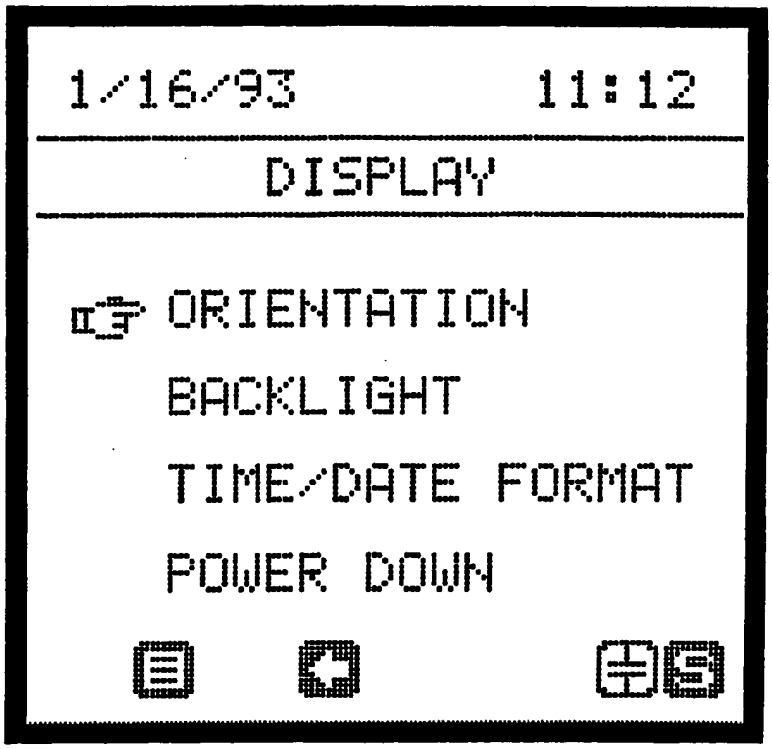

FIGURE 5N

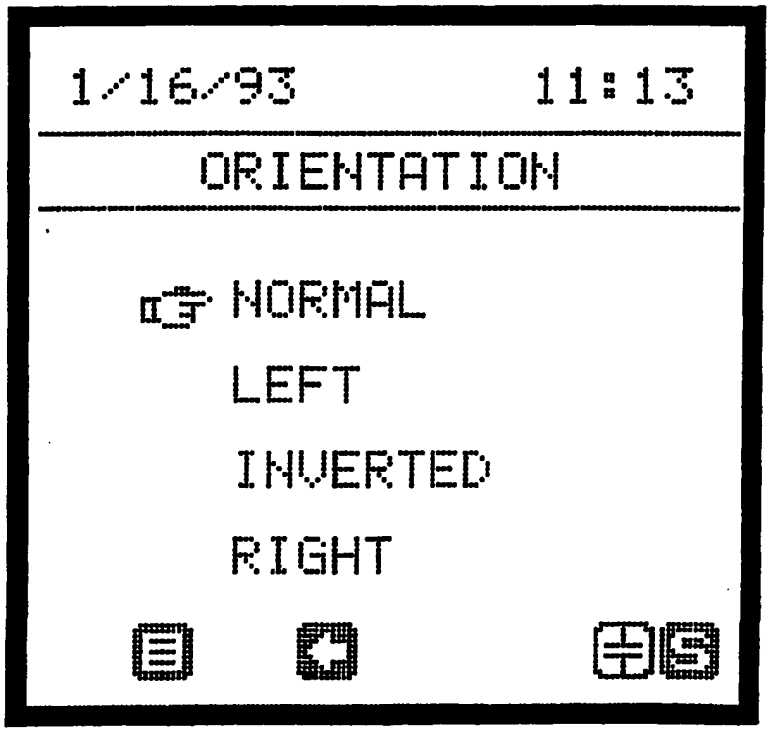

FIGURE 5O

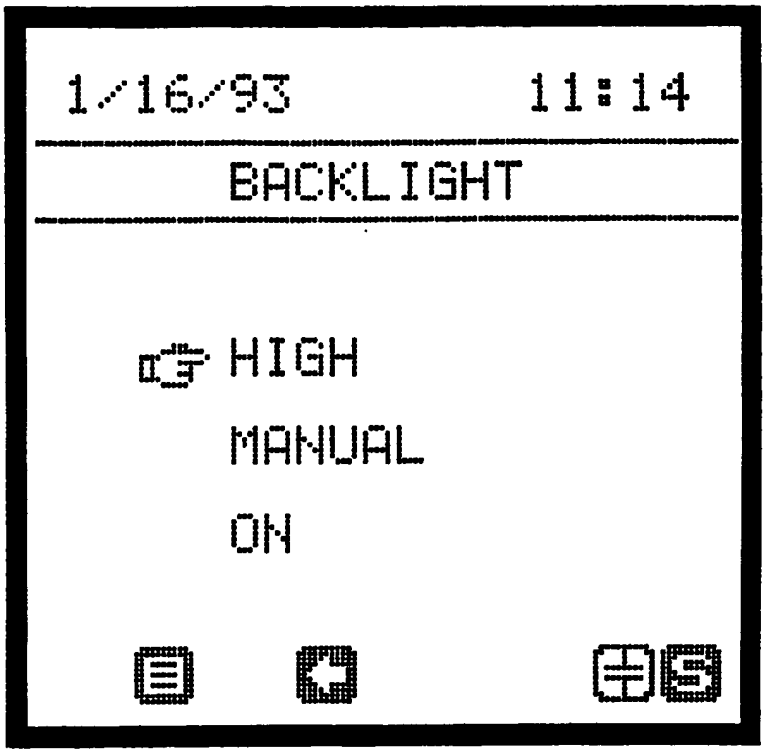

FIGURE 5P

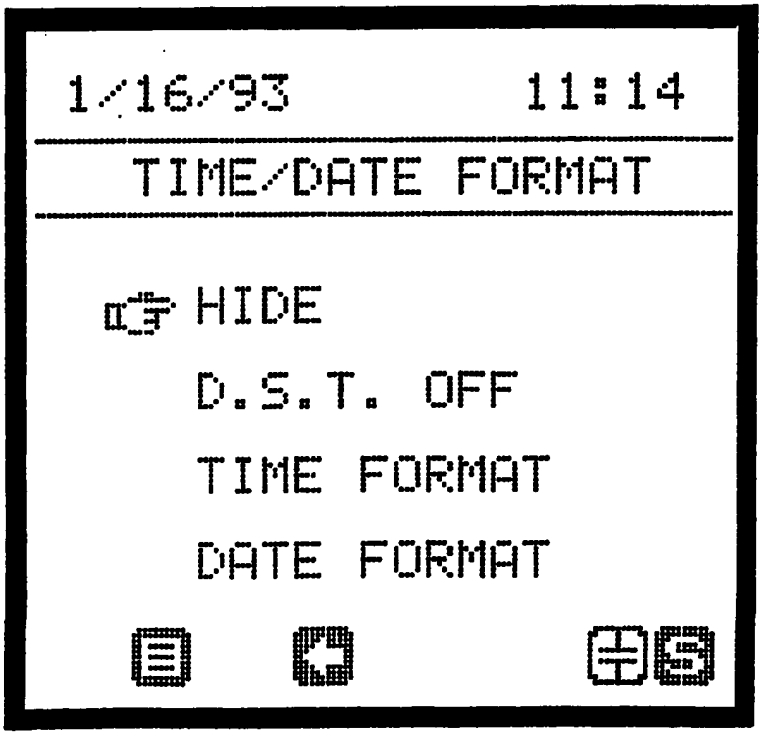

FIGURE 5Q

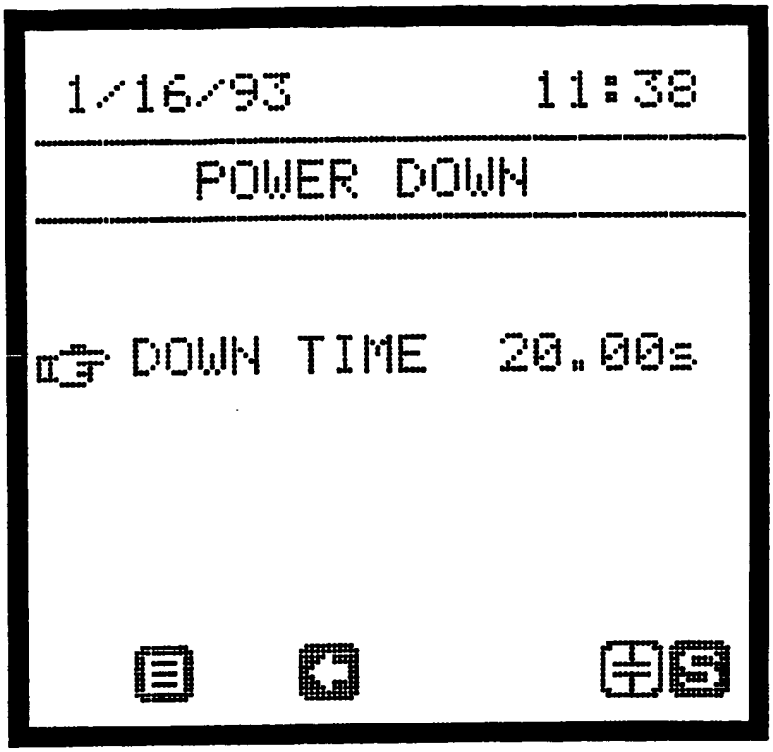

FIGURE 5T

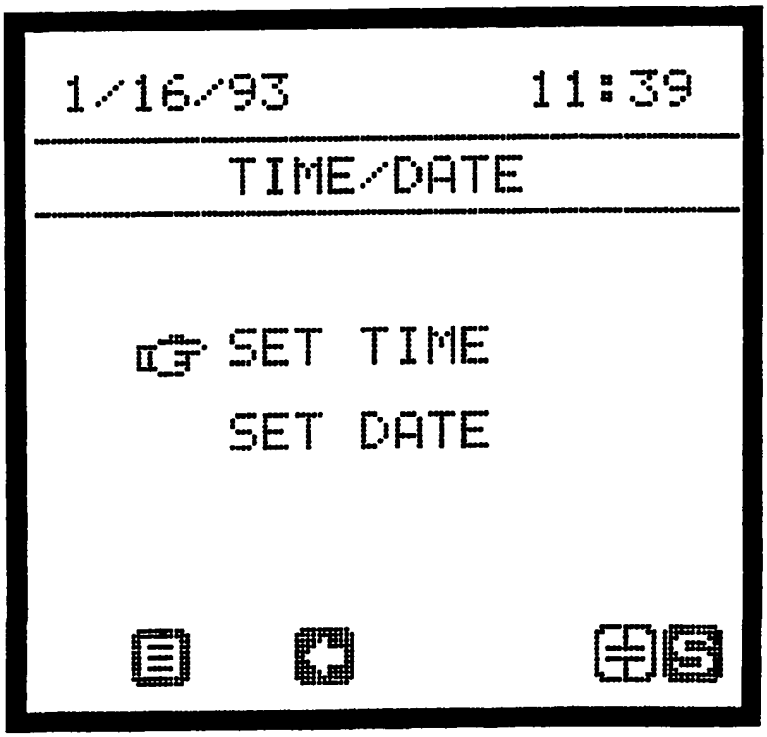

FIGURE 5U

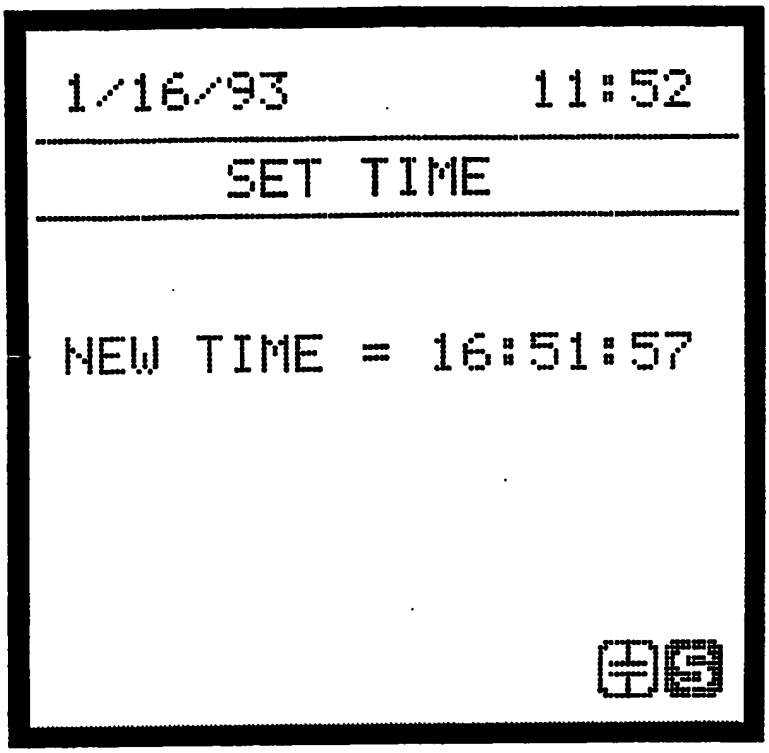

FIGURE 5V

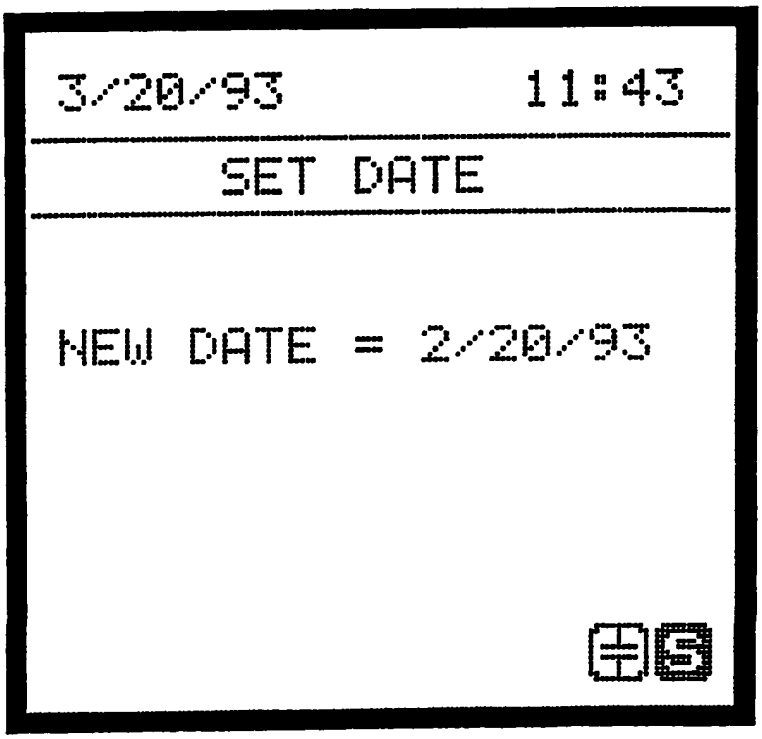

FIGURE 5W

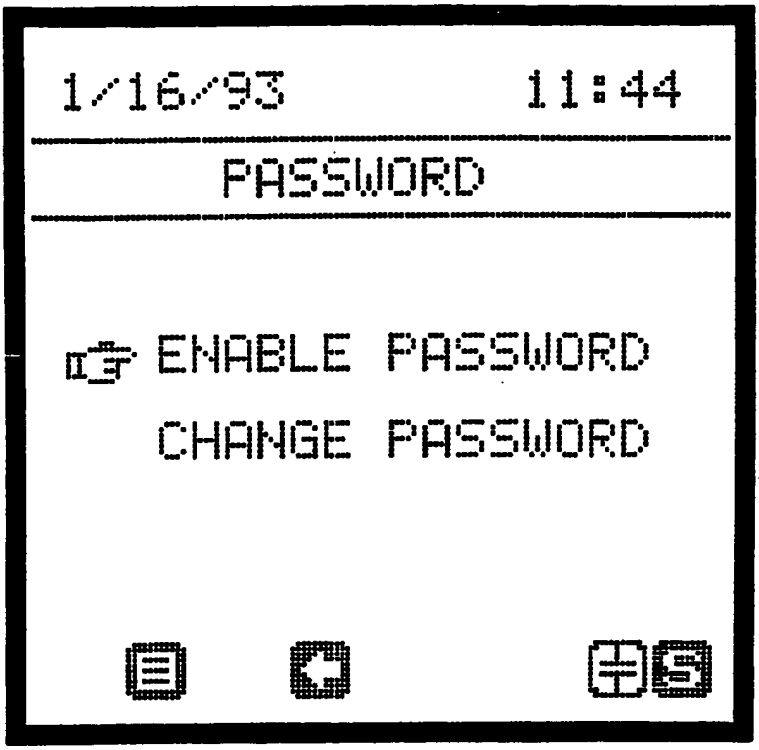

FIGURE 5X

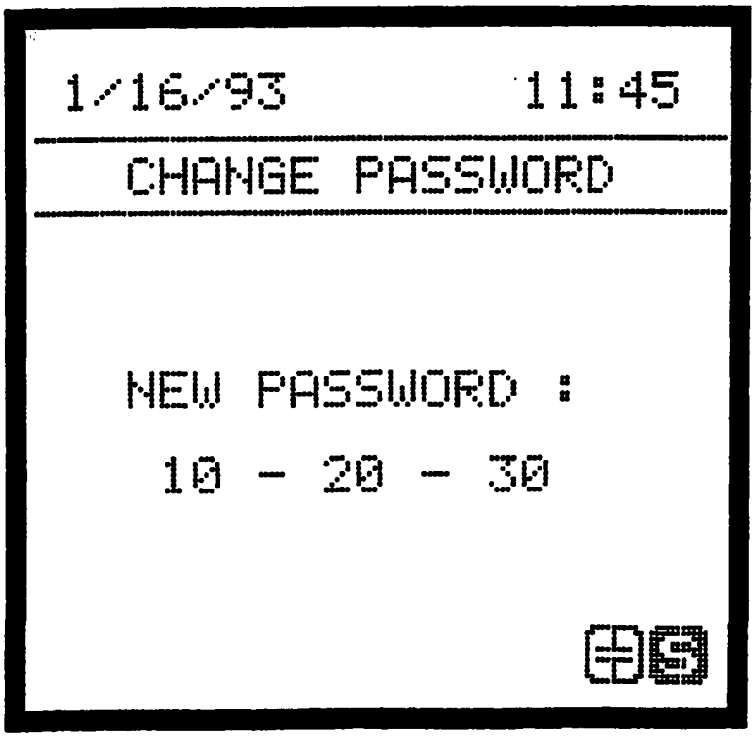

FIGURE 5Y

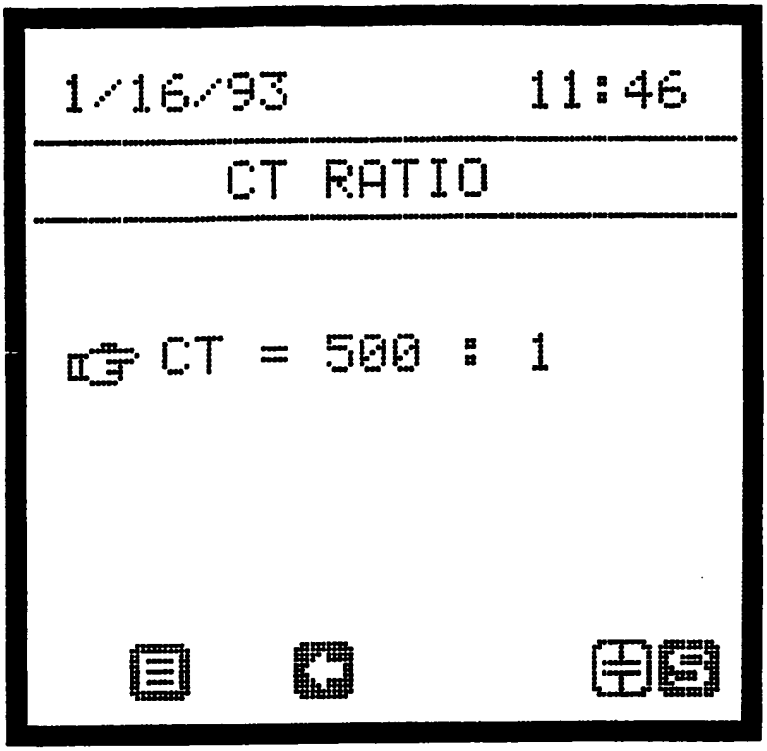

FIGURE 5Z

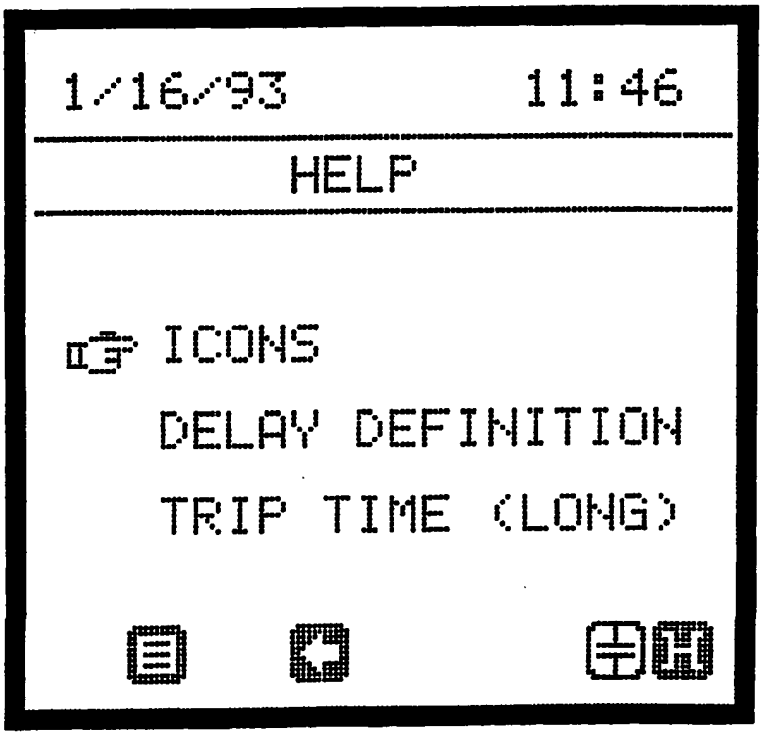

FIGURE 5AA

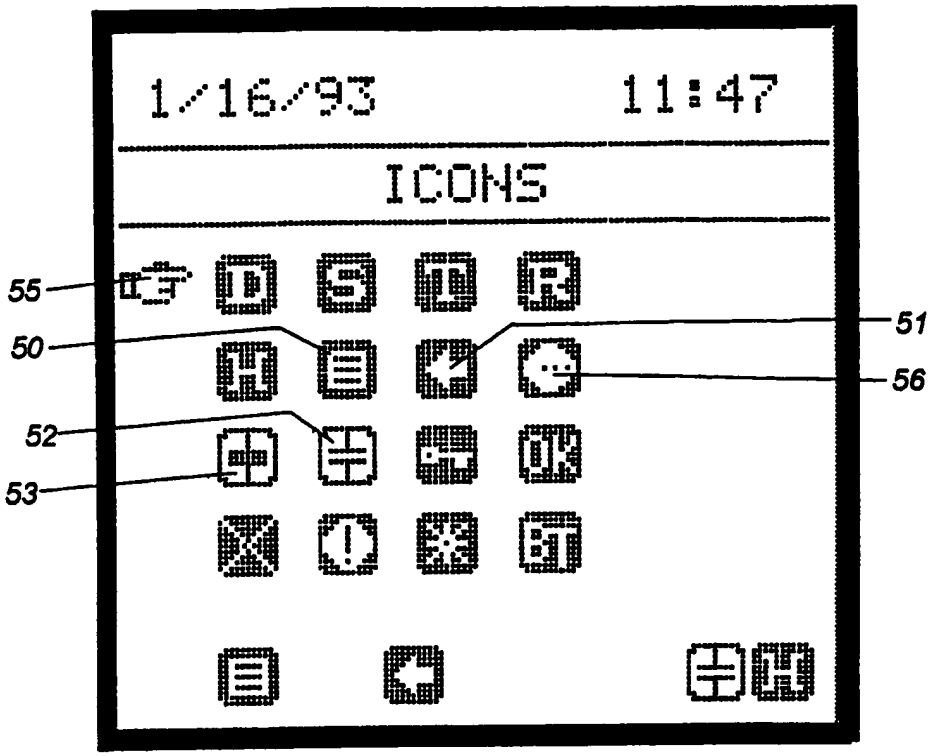

FIGURE 5BB

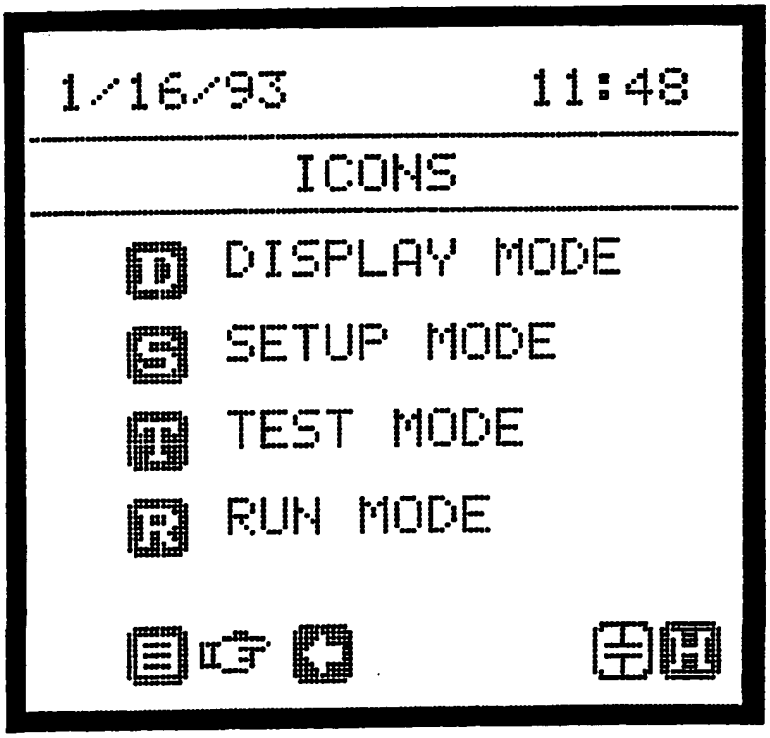

FIGURE 5CC

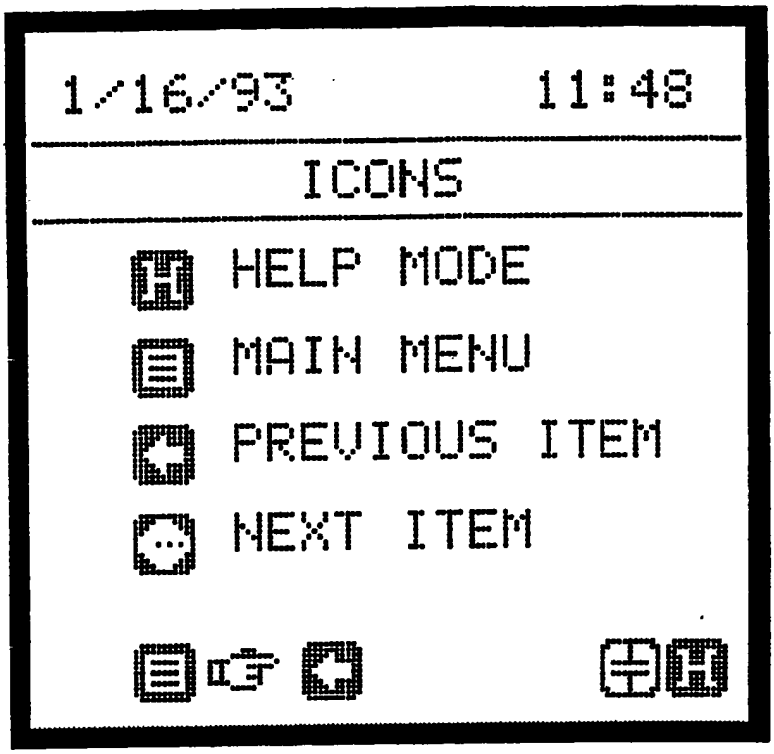

FIGURE 5DD

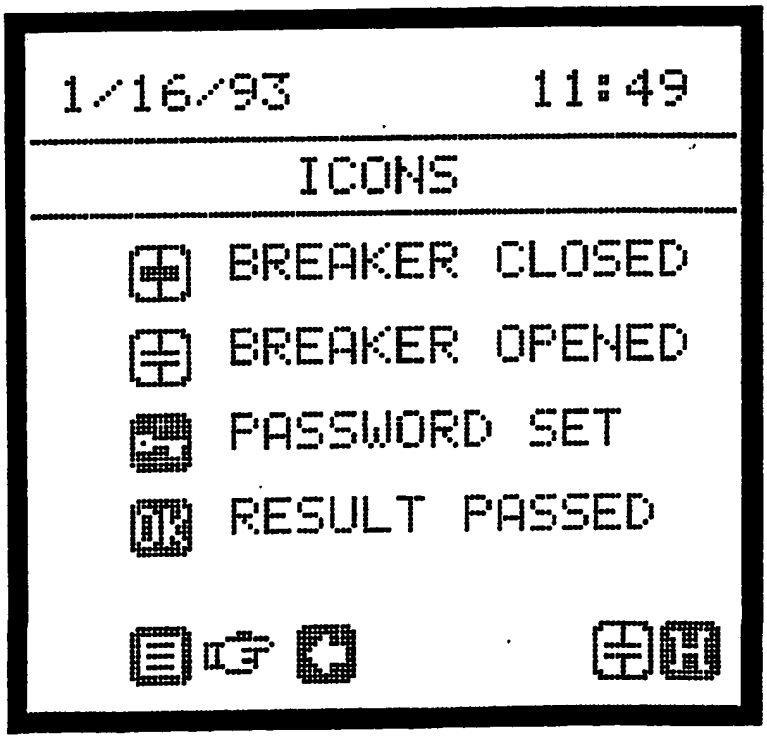

FIGURE 5EE

FIGURE 5FF

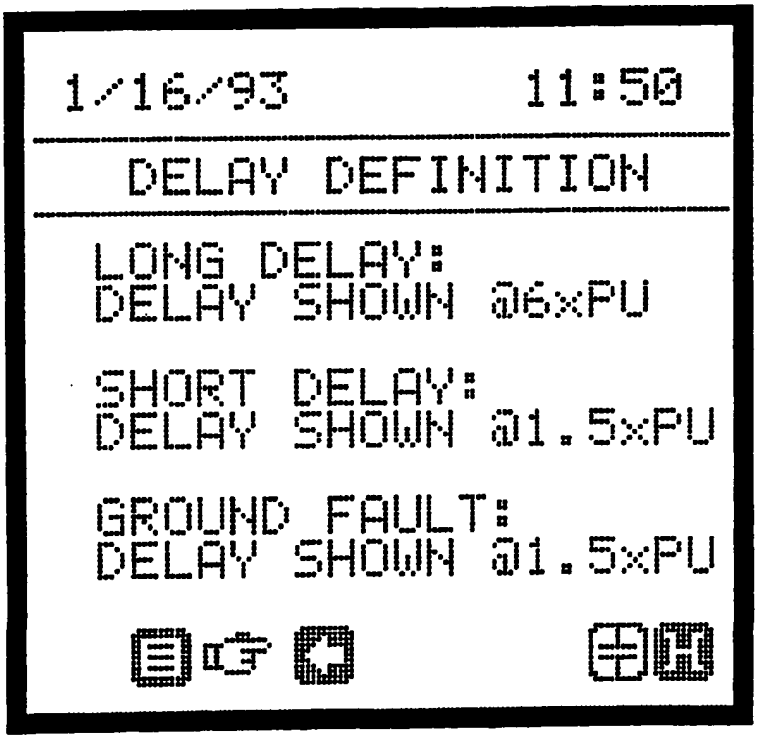

FIGURE 5GG

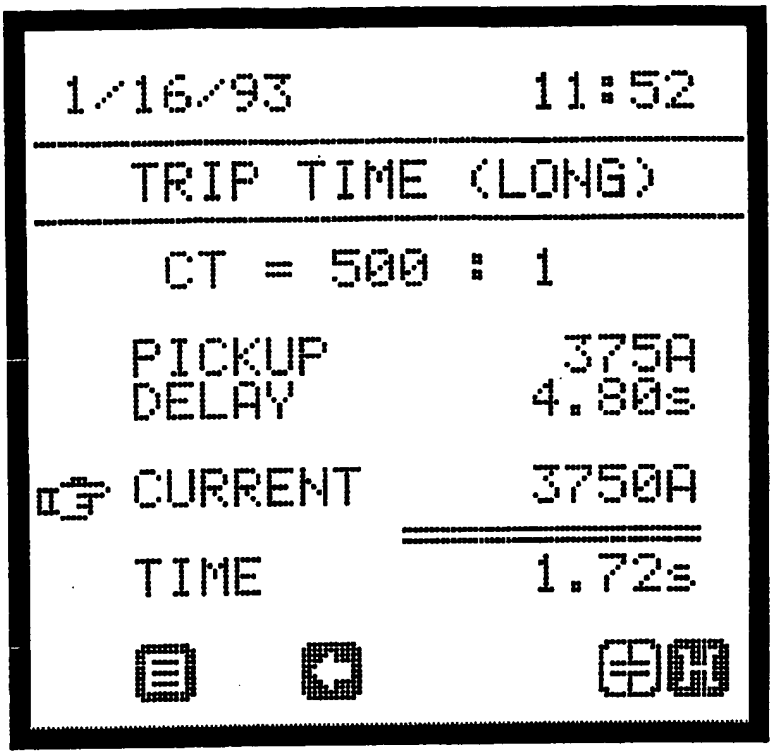

FIGURE 5HH

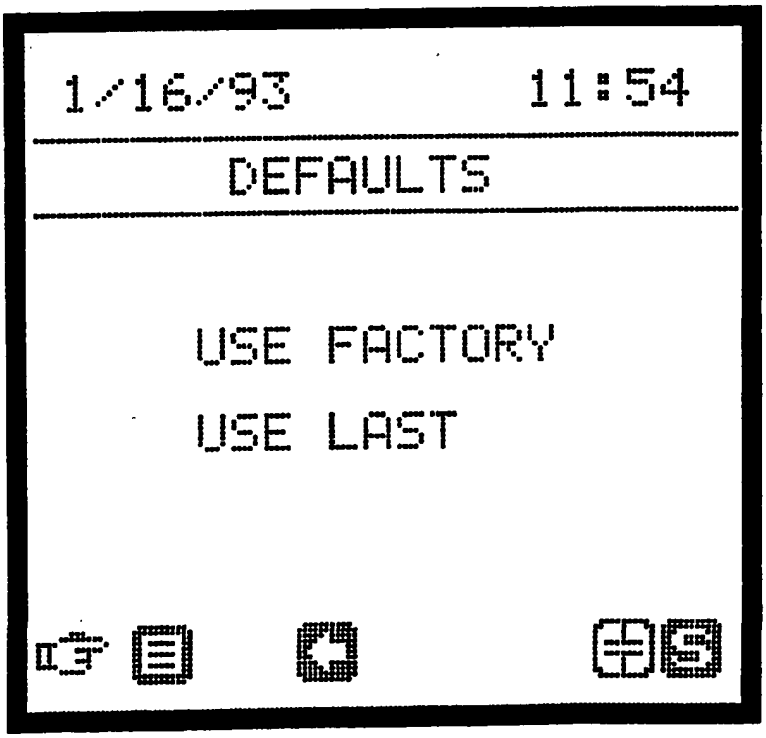

FIGURE 5II

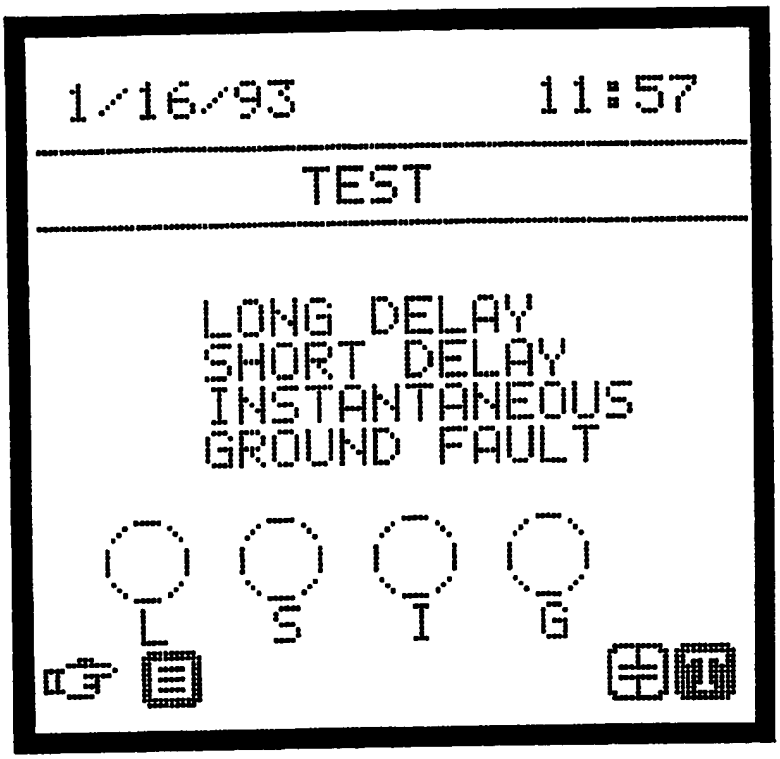

FIGURE 5JJ

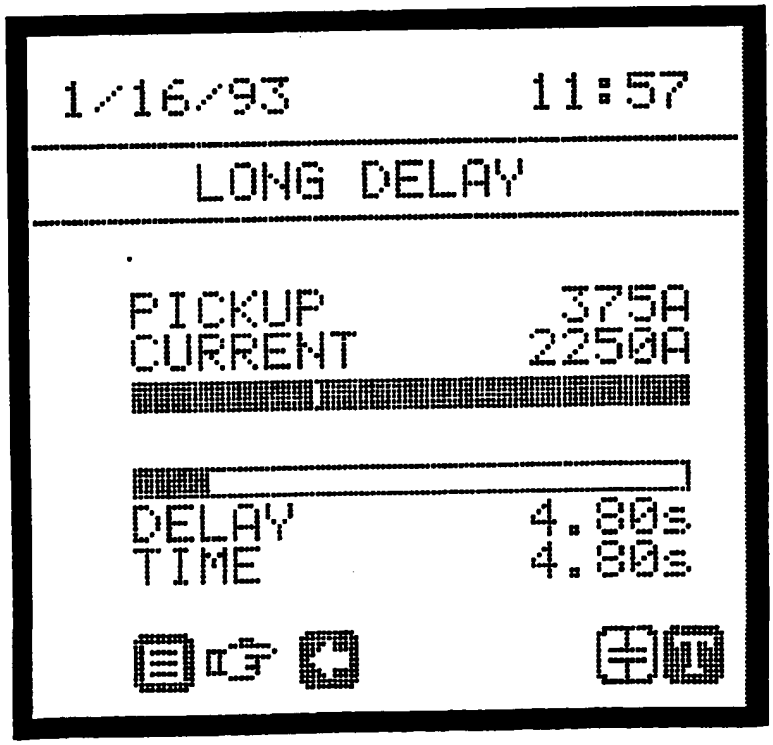

FIGURE 5KK

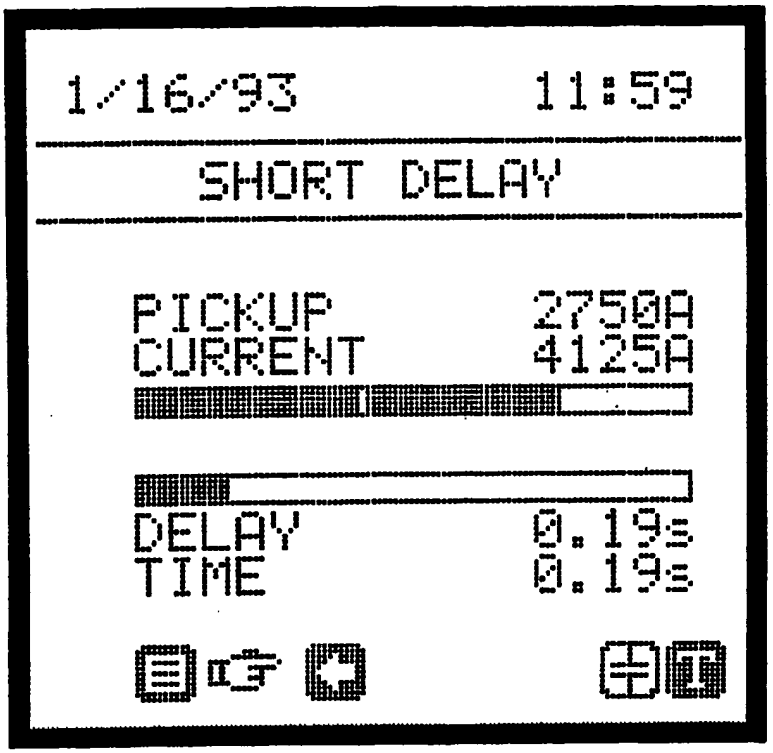

FIGURE 5LL

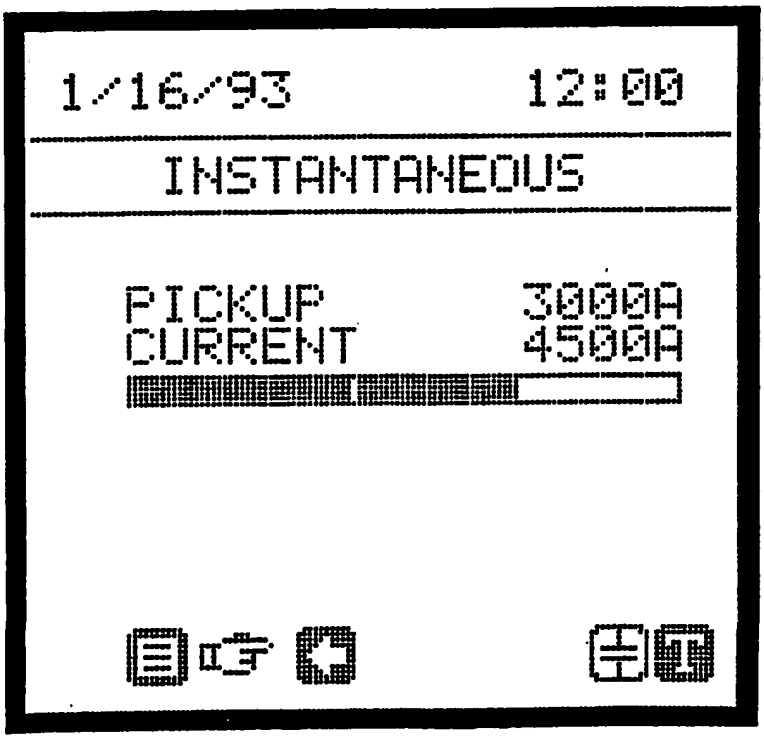

FIGURE 5MM

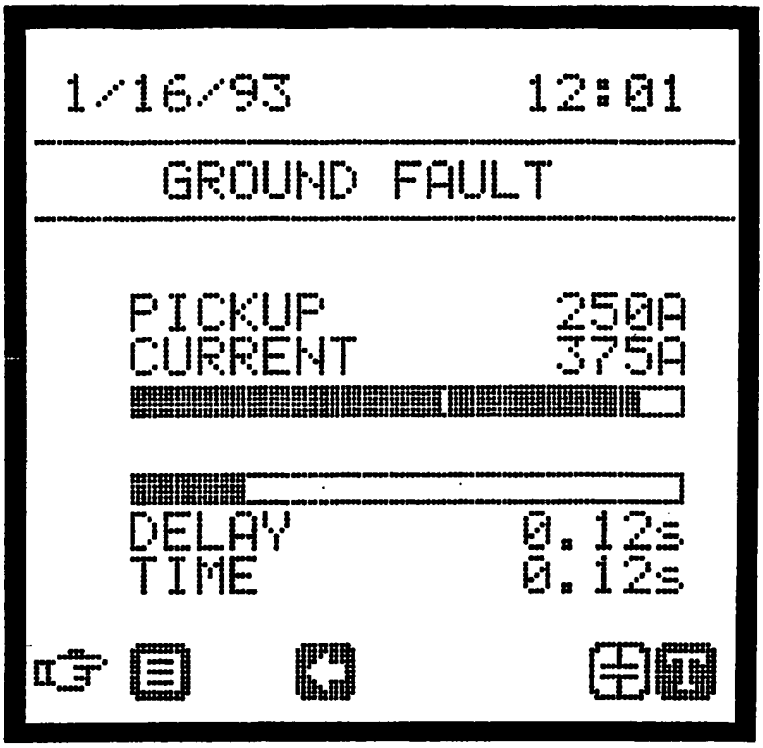

FIGURE 5NN

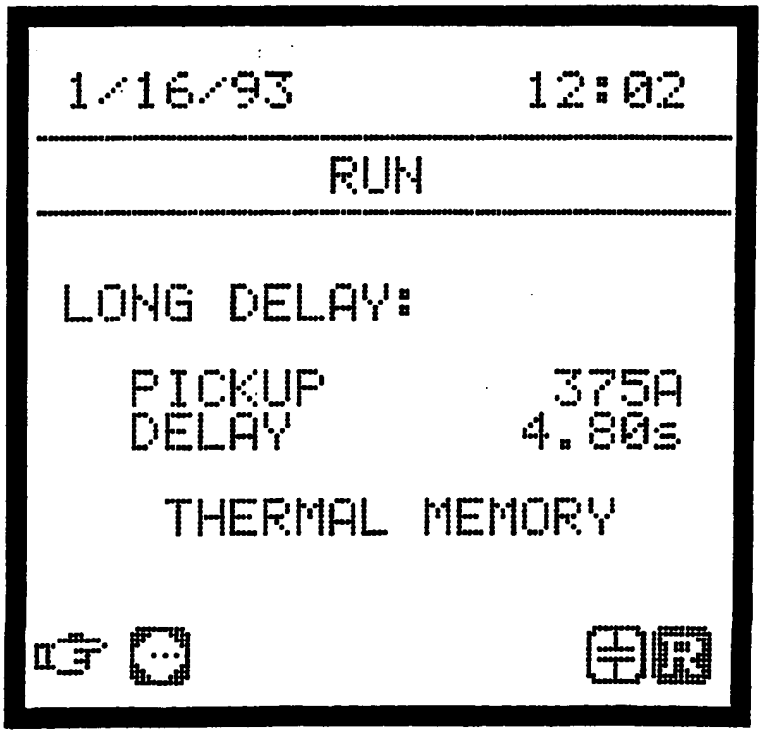

FIGURE 5OO

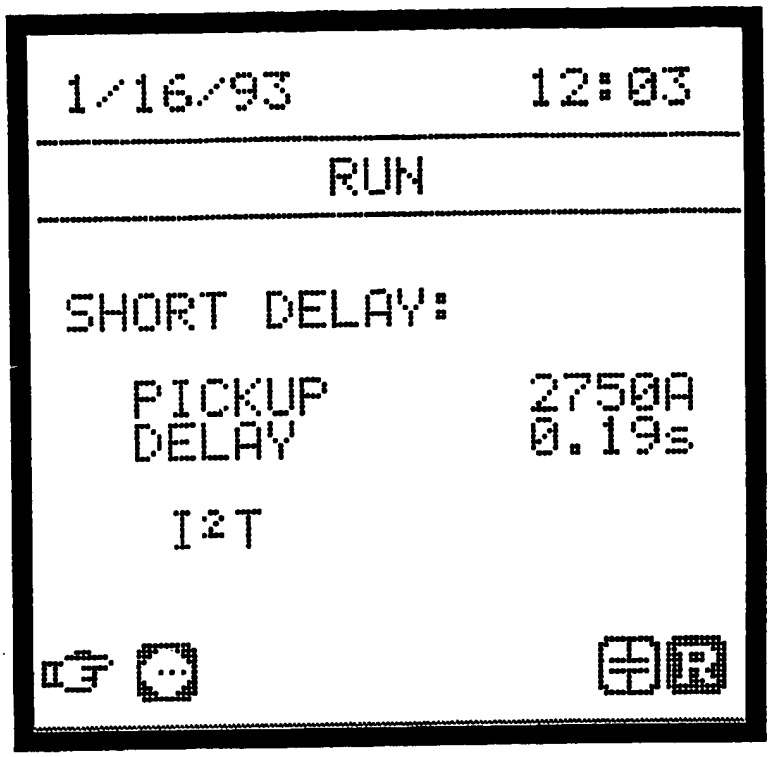

FIGURE 5PP

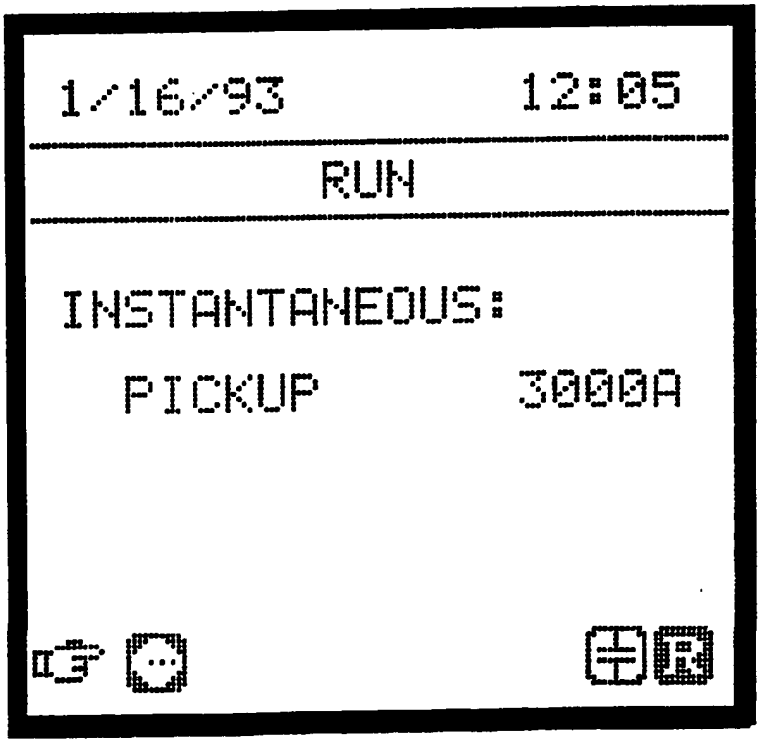

FIGURE 5QQ

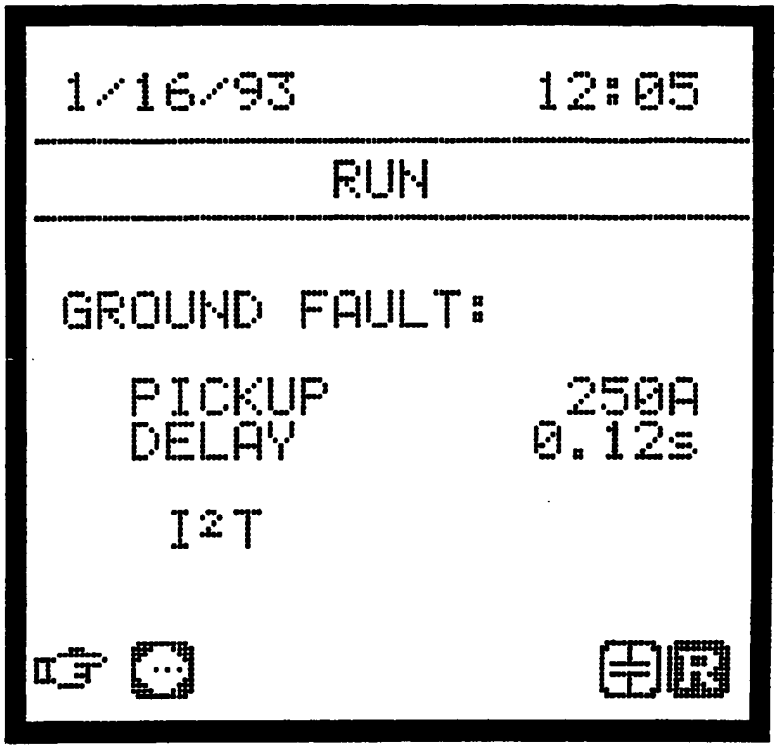

FIGURE 5RR

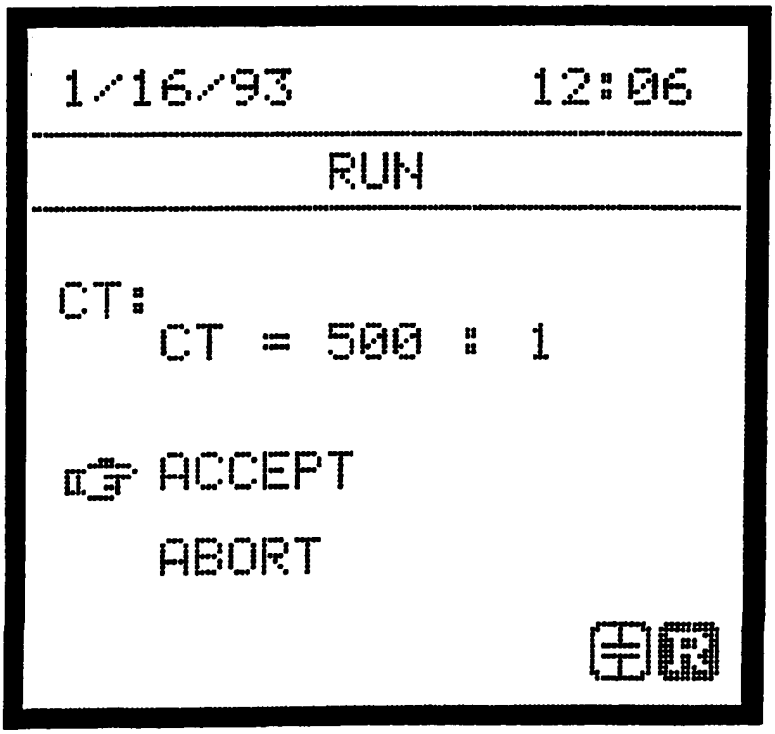

FIGURE 5SS

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(71) Applicant (*for all designated States except US*): CARRIERE TECHNICAL INDUSTRIES, a division of DERLAN MANUFACTURING INC. [CA/CA]; 5621 Finch Avenue East, Scarborough, Ontario M1B 2T9 (CA).

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(75) Inventors/Applicants (*for US only*): GOOCH, Michael, John [CA/CA]; 21 Archer Drive, Ajax, Ontario L1S 2Z3 (CA). NG, Patrick, Che, Wa [GB/CA]; Apartment 601, 168 Bonis Avenue, Scarborough, Ontario M1T 3V6 (CA).

(74) Agent: BERESKIN & PARR; 40 King Street West, 40th Floor, Toronto, Ontario M5H 3Y2 (CA).

(81) Designated States: AT, AU, BB, BG, BR, BY, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
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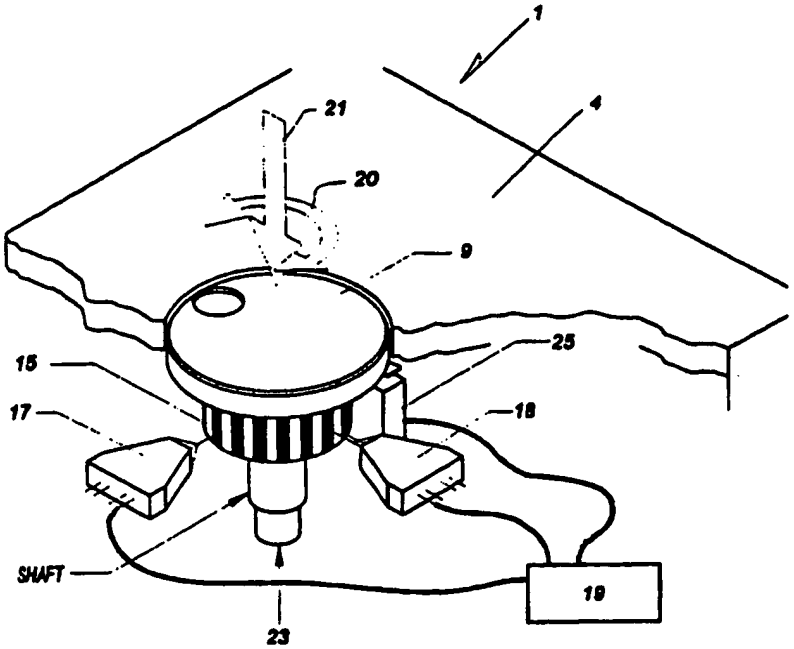
19 September 1996 (19.09.96)

(54) Title: DATA INPUT DEVICE



(57) Abstract

A data input device has a moveable element, for example, a circular knob. This is moveable in two different directions, one of which can be circular and the other can be along the axis of the knob. A display unit is preferably associated with the screen, so that rotation of the knob in a first direction causes a pointer to scroll through a menu on the screen. Actuation of the knob in the second direction causes the different screens to be selected, or selected items on the screen to change their state. It can be used as a sole input device for microprocessor-based devices.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EA 94/00026

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 G06K11/18 G06F3/023

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 G06K G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 416 731 (HEWLETT-PACKARD COMPANY) 13 March 1991 see page 3, column 4, line 19 - line 40; figure 1 see page 5, column 8, line 38 - line 49 see page 6, column 10, line 30 - line 35 see page 7, column 11, line 43 - column 12, line 19 ---	1-5, 10-13
Y	EP,A,0 505 037 (N.A.D., INC.) 23 September 1992 see abstract; figure 4 see page 3, column 3, line 41 - line 46 see page 3, column 4, line 47 - page 4, column 5, line 5 see page 4, column 5, line 42 - line 46 --- -/--	1,6,7, 10-13

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Date of the actual completion of the international search	Date of mailing of the international search report
26 April 1994	15.05.94

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Bravo, P

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International Application No
PCT/EP 94/00026

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EDN - ELECTRICAL DESIGN NEWS vol. 34, no. 3 , February 1989 , NEWTON, MA, US pages 119 - 120 S. H. LEIBSON 'Thumb-actuated, cursor-positioning device provides 2-D axis control in a small space' see page 120, line 5 - line 22; figure 1	1,6-8, 10-13
Y	IBM TECHNICAL DISCLOSURE BULLETIN vol. 26, no. 11 , April 1984 , ARMONK, NY pages 5826 - 5827 'Hand-held data input device' see the whole document	8,11-13
P,X	EP,A,0 531 829 (ALPS ELECTRIC CO., LTD) 17 March 1993 see abstract see page 4, column 5, line 55 - column 6, line 34; figure 5	1,6,7, 10-13
P,Y		8,11-13
A	US,A,4 870 389 (T. ISHIWATA ET AL.) 26 September 1989 see figure 1	5
A	US,A,5 175 534 (E. A. THATCHER) 29 December 1992 see column 7, line 11 - line 26; figure 4	9
A	EP,A,0 382 354 (HEWLETT-PACKARD COMPANY) 16 August 1990 see abstract see page 3, column 4, line 31 - line 43; figure 4	10
A	PATENT ABSTRACTS OF JAPAN vol. 014, no. 329 (P-1076)16 July 1990 & JP,A,02 108 915 (SONY CORP.) 20 April 1990 see abstract	10

INTERNATIONAL SEARCH REPORT

...formation on patent family members

Inter...nal Application No
PCT/CA 94/00026

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